527.

SUPREME COURT OF THE UNITED STATES.

No. 224.

HENRY O'RIELLY, EUGENE L. WHITMAN, AND W. F. B. HASTINGS, APPELLANTS,

vs.

SAMUEL F. B. MORSE, ALFRED VAIL, AND FRANCIS O. J. SMITH.

APPEAL FROM THE CIRCUIT COURT U. S. FOR THE DISTRICT OF KENTUCKY.

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Pleas before the honorable Thomas B. Monroe, one of the judges of the United States of America, in and for the eighth circuit and Kentucky district, at the Capitol, in the town of Frankfort, at the October term of said court, in the year of our Lord 1849.

Be it remembered, that heretofore, to wit, on the 11th day of September, 1848, the following order was made by the district judge, at his chamber, to wit:

SAMUEL F. B. MORSE, Alfred Vail, and Francis O. J. Smith, complainants,
vs.
HENRY O'RIELLY, Eugene L. Whitman, and W. F. B. Hastings, defendants.
} In chancery.

Order—filing bill.

This day came the complainants and presented their bill, which is filed, together with the exhibits, &c., on which is the following order of the judge, at his chamber:

August 14*th*, 1848.

Order—Injunction.

On motion for an injunction, Samuel F. B. Morse and his co-complainants in the above bill by their counsel, and Henry O'Rielly and the other defendants to the bill, by their counsel, appeared; and the parties having stated and admitted that the defendants had sufficient notice, the complainants moved on their bill, with the affidavits thereto attached, and the documents therewith exhibited, for an order of injunction according to the prayer of their bill; whereupon, the defendant, Henry O'Rielly, presented and read his answer to the complainants' bill, and the parties respectively read their proofs; whereupon, the matter was argued by the counsel, and the hearing, decision, and consideration thereof was continued until this day. And now,

Sept'r 9, 1848.

It is found and considered, that the letters patent of the United States to the complainant, Samuel F. B. Morse, are valid, and that the complainants are thereby, and as is by them alleged, vested with the exclusive right thereby granted; and that the defendants, by their operations, have infringed and violated these rights of the complainants, and it appears would persist in such violation and infringement. The motion, therefore, prevails; and it is ordered that the defendants, Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, shall be, and they are enjoined and commanded, that they and each of them, their servants and agents, do henceforth desist and refrain from all further employment within the district of Kentucky of the electro-magnetic

telegraph, in the complainants' bill mentioned, and which, it appears on the proof, was by the defendants lately employed as the complainants alleged; and of the telegraph by the defendant, O'Rielly, in his answer described, and which it is therein represented was at the time of his answer employed by the defendants, and by them called the "Columbian telegraph,' but which is here considered for the purpose of this matter one and the same telegraph; the transmission of intelligence which is in one place to another distant place, by making thereat a legible record thereof, and from such employment for such purpose of any other telegraph worked by the motive power of electro-magnetism, and consisting of continued circuits of electricity, connected by what is called by the complainants the receiver or receiving magnet, and by the defendants the mutator; and the register worked by the electro-magnetism in whole or in part, in any mode or in any combination or combinations, within the exclusive rights as here expounded, granted by the letters patent to the complainant, Samuel F. B. Morse, until this order shall have been discharged, or the effect thereof shall have expired. On the complainants causing to be executed, by two or more sufficient sureties, a bond to the defendants in the penal sum of five thousand dollars, with condition that if the complainants shall prosecute their suit with effect and obtain a final decree in conformity to this order of injunction, or in case it shall hereafter appear that the injunction is wrongfully obtained, and it shall be dissolved or discharged, and the complainants shall thereupon pay to the said O'Rielly, Whitman, and Hastings, all damages and costs which they, or either of them, shall thereby have suffered. And afterwards on this day, September 11th, 1848, the bond having been executed according to the above requirement, which is approved and hereto attached, the injunction accordingly is awarded, and the clerk is directed to issue the writ, with the subpœna upon the bill.

Whereupon, on this day, September 12th, 1848, there was issued the subpœna, returnable to the November rules next, and the writ of injunction, according to the order of the judge.

The following is the bill of the complainants, to wit:

Bill.

In the circuit court of the United States, for the eighth circuit and district of Kentucky. In equity.

To the honorable judges of the circuit court of the United States, for the district of Kentucky.

Samuel F. B. Morse, a citizen of the State of New York, Alfred Vail, a citizen of the State of New Jersey, and Francis O. J. Smith, a citizen of the State of Maine, and all citizens of the United States, bring this their bill against Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings; and thereupon your orator Morse states, and your orators Vail and Smith, on information, say, that they do verily believe that your orator Morse was heretofore, before and on the twenty-eighth day of

September, eighteen hundred and thirty-seven, the true and original inventor of a certain new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism, or the motive power of electricity; which improvement was not at the time of his filing the caveat, next hereinafter mentioned and set forth, in public use or on sale with his consent or allowance.

And that your orator, Morse, being so as aforesaid the inventor of said improvement, and a citizen of the United States, on the sixth day of October, eighteen hundred and thirty-seven, filed in the office of the Commissioner of Patents of the United States, in the city of Washington, a caveat, accompanied by a specification setting forth his said invention, and praying to be protected in respect thereto, as provided by law in such cases. Your orators file herewith true copies of the said caveat and specification, duly certified from the record of the said Patent office, and pray that they may be taken as parts of this bill.

Your orators further show unto your honors, that your orator, Morse, inventor of the said improvement, and citizen as aforesaid, made application to the proper department of the Government of the United States for a patent therefor, and having complied with the requirements of the laws of the United States, he obtained letters patent for said improvement, pursuant to said laws, under the seal of the said Patent office, and bearing date the twentieth day of June, eighteen hundred and forty, and acquired thereby the exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvements for the term of fourteen years from the date of said patent. Your orators further shew, that a specification of the said improvement in the words of your orator, Morse, accompanied by certain drawings, was annexed to the said letters patent, and formed a part thereof. They herewith file true copies of the said letters patent, specifications, and drawings, duly certified from the records of the said Patent office, and pray that they may be taken as parts of this bill.

Your orators further shew, that on account of a defect in the specification which formed a part of the said letters patent, your orator, Morse, surrendered the same in conformity with the laws of the United States, and on the fifteenth day of January, eighteen hundred and forty-six, a reissue of the said letters patent was granted, in due form of law, to him, under the seal of the said Patent office, and bearing date the day and year last aforesaid, with a description or specification of the said improvement in the words of your orator, Morse, in a schedule annexed to and made part of the said letters patent, accompanied with drawings and figures, setting forth in what the said improvement consisted in more full, clear, and exact terms than was done in the said surrendered letters patent.

And that your orator, Morse, obtained by the said reissued letters patent the exclusive right and liberty of making, constructing, using, and vending to others to be used, for the residue of the said term of fourteen years, from the said twentieth day of June, eighteen hundred and forty, then unexpired, the said improvement as described in the

said reissued letters patents. Your orators file herewith true copies of the said re-issued letters patent, specifications, and drawings, duly certified from the records of the Patent office of the United States, and pray that they may be taken as parts of this bill.

Your orator, Morse, further states, and your orators, Vail and Smith, on information, further say, that they do verily believe, that before and on the eleventh day of April, eighteen hundred and forty-six, your orator, Morse, was the true, original, and first inventor of a certain other new and useful improvement in electro-magnetic telegraphs, which was not known or used before his said invention, and which was not, at the time of his application for a patent therefor, in public use, or on sale with his consent or allowance; and that being such inventor, and a citizen of the United States, and having made a proper application for a patent, and complied with the requirements of the laws of the United States, your orator, Morse, obtained letters patent for said last mentioned improvement, in due form from under the seal of the said Patent office, and dated the eleventh day of April, eighteen hundred and forty-six, which secured to him the exclusive right and liberty of making, constructing, using, and vending to others to be used, for the term of fourteen years from the day and year last aforesaid, the said last mentioned improvement which was set forth in a description or specification of the same in the words of your orator, Morse, and which, accompanied with drawings and figures, was annexed to and formed a part of said last mentioned letters patent; your orators file herewith a true copy of the said letters patent, with the said specification and drawings, duly certified from the records of the said Patent office, and pray that it may be taken as a part of this bill.

Your orators further state, that on account of defects in the specifications which formed parts of the two patents issued as aforesaid to your orator, Morse, respectively, on the fifteenth day of January, eighteen hundred and forty-six, and on the eleventh day of April, eighteen hundred and forty-six, he surrendered the same in conformity with the laws of the United States; and on the thirteenth day of June, eighteen hundred and forty-eight, a reissue of each of the said letters patent was granted to him, in due form of law, in two letters patent, under the seal of the Patent office of the United States, each bearing date the day and year last aforesaid, and each of the said letters patent, with a description or specification of the improvement therein mentioned, in the words of your orator, Morse, in a schedule annexed to and forming a part of the same, accompanied with drawings and figures, setting forth in what the said improvement consisted, in more full, clear, and exact terms than was done in said surrendered letters patent; and that your orator, Morse, obtained by the said renewed letters patent the exclusive right and liberty of making, constructing, using, and vending to others to be used, the improvement mentioned in the said letters patent reissued in place of the surrendered patent, which was dated on the fifteenth day of January, eighteen hundred and forty-six, for the residue of the term of fourteen years from the twentieth day of June, eighteen

hundred and forty; and the exclusive right and liberty of making, constructing, using, and vending to others to be used, the improvement mentioned in the said letters patent reissued in place of the surrendered patent, which was dated on the eleventh day of April, eighteen hundred and forty-six, for the residue of the term of fourteen years from the said last mentioned date; your orators file herewith true copies of the said last mentioned reissued letters patent, with their specifications and drawings, certified from the records of the said Patent office, and pray that they may be taken as parts of this bill.

Your orators further show that, before the granting of the letters patent first herein mentioned, and in the month of March, eighteen hundred and thirty-eight, your orator, Morse, by an instrument in writing, bearing date the . day of March in said year, duly executed by him under his hand, and delivered to your orator, Smith, for a valuable consideration paid to him by your orator, Smith, did bargain, sell, and convey to your orator, Smith, his heirs and assigns, one undivided fourth part of his said first mentioned invention, and of all his right and property in the said fourth part that he had or might have from any letters patent for the same granted by the United States and within the limits thereof; also five undivided sixteenth parts of all the rights, title, and property, which he had or might receive, or otherwise derive from and in said invention, without the limits of the United States by letters patent or otherwise, excepting in the Republic of Texas; your orator, Morse, thereby constituting your orator, Smith, joint owner with him of said invention, and all property consisting therein, both within and without the limits of the United [States,] in the proportions aforesaid. And your orator, Morse, did, by said instrument, further agree with your orator, Smith, that, as soon as might be after letters patent should be obtained, he would execute sufficient deeds of transfer of said parts and of all rights and property incident thereto; and did further agree to account to your orator, Smith, in the proportions before named from the date of said instrument, for the proceeds of all sales of rights to use said invention that might accrue to him; and did, also, by said instrument transfer to your orator, Smith, a right to share in the same proportions in all improvements that your orator, Morse, might make in said invention. All of which will more fully appear by the said instrument, which was recorded in the said Patent office, and a duly certified copy of which therefrom is filed herewith, and prayed to be taken as part of this bill.

Your orators further show, that your orator, Morse, did, on the fifth day of March, eighteen hundred and thirty-eight, by an instrument in writing, bearing date on said day, duly executed by him, transfer and convey to one Leonard D. Gale, of New York, his heirs and assigns, one undivided sixteenth part of said invention, and of all the rights your orator, Morse, had or might acquire in the said sixteenth part within and without the United States, excepting only in the Republic of Texas; and did covenant with the said Gale that, after letters patent should be obtained from the United States or any other Government, he would

execute sufficient deeds of transfer of said part; and that he would account to said Gale, in said proportion, for all proceeds of sales of rights to use said invention; and said instrument included also a right to said Gale to share in said proportion in all improvements that your orator, Morse, might make in said invention.

And your orators further show, that, on the second day of February, eighteen hundred and forty-seven, the said Leonard D. Gale did, by an instrument in writing, bearing date on that day, duly executed by him under his hand, and delivered to your orator, Morse, for the sum of five dollars, and other valuable consideration paid and rendered by your orator, Morse, sell, assign, set over, and reconvey to your orator, Morse, the said one-sixteenth part of the right, title, and interest in the said invention of an electro-magnetic telegraph and in the said improvements therein, which were, as aforesaid, assigned and secured to the said Gale by your orator, Morse, in and by his instrument in writing aforesaid, dated the fifth day of March, eighteen hundred and thirty-eight; the same to be held and enjoyed by your orator, Morse, as fully as it would have been enjoyed by said Gale had such assignment and reconveyance by him to your orator, Morse, not been made, as will more fully appear by said last mentioned instrument in writing, which, as well as the instrument last aforesaid, was recorded in the said Patent office. Your orators file herewith duly certified copies of said two last mentioned instruments from the records of the said office, and pray that they may be taken as parts of this bill.

Your orators further show that, on the fifth day of September, eighteen hundred and forty-four, your orator, Morse, did, by an instrument in writing, bearing date on that day, duly executed by him under his hand and seal, and delivered to your orator, Vail, for a valuable consideration to him paid by your orator, Vail, sell, assign, set over, and convey to your orator, Vail, his heirs and assigns, one undivided eighth part of his said invention, and all his right, title, and interest which he had on said eighth part of the same, as secured to him by the said letters patent of the twentieth day of June, eighteen hundred and forty, or which might thereafter be granted by the said United States within the limits thereof; also one undivided eighth part of all the right, title, and property which your orator, Morse, had, or might secure, or otherwise derive from and in said invention without the limits of the United States, by letters patent or otherwise, excepting in the Republic of Texas; your orator, Morse, thereby constituting your orator, Vail, joint owner with himself in said invention and all property therein in the proportion above specified; and that your orator, Morse, did, by the said instrument, further agree with your orator, Vail, that he would execute sufficient deeds of transfer of said parts of said letters patent, then already obtained, or which might be obtained, and of all rights incident thereto, and to account from the date of the said instrument to your orator, Vail, in the proportion aforesaid, for all the proceeds of sales of rights to use said invention; including also, by said instrument, a right to your orator, Vail, to share in like proportions as aforesaid in all im-

provements that might be made by your orator, Morse, in said invention, as by said instrument in writing will fully appear; which having been recorded in the said Patent office, your orators file herewith a copy of the same duly certified from said office, and pray that it may be taken as part of this bill.

And your orators are advised to say, that, in virtue of the several instruments above set forth, they became jointly interested in the proportions in the said instruments, and herein specified, in all of the said inventions and improvements made by your orator, Morse, hereinbefore set forth, and jointly interested in, or joint owners in, the said proportions of all the rights, titles, and interests granted and secured by all of the letters patent hereinbefore set forth, as well those which were issued after, as those which were issued before, the making of said instruments within and throughout the United States; and they allege that they are entitled to the sole and exclusive right to make, construct, use, and vend to others to be used, the said improvements patented by the said letters patent, on any line of telegraphic communication extending from the city of Louisville, in the State and district of Kentucky, to Nashville, in the State of Tennessee, and on to Memphis, in said State, and to New Orleans, in the State of Louisiana.

And your orators further show, that the only method whereby the said several improvements, patented by the several letters patent, can be made available for use or profit, is by the extension of a line or lines between different points, upon posts or otherwise of metallic wire, and the use of the said several patented improvements in conveying intelligence and information, both public and private, by means of said line or lines of wire for compensation to be paid therefor; that those were the objects which your orator, Morse, had in view in the invention and patenting of the said several improvements; that they were the object which your orators, Vail and Smith, had in view in becoming, as aforesaid, the owners of portions of the said several patented improvements; that these objects necessarily involve, in their successful attainment along any extended line, the expenditure of large sums of money and of a very considerable portion of the duration of a patent, and they have hitherto been found to transcend the scope of individual unassociated enterprise.

And in order that the great utility and importance of the invention may more fully appear, and the value of your orators' rights therein may be better understood, your orators further show, that by an act of the Congress of the United States, passed March the third, one thousand eight hundred and forty-three, entitled "An act to test the practicability of establishing a system of electro-magnetic telegraphs by the United States," the sum of thirty thousand dollars was appropriated out of any moneys in the Treasury of the United States not otherwise appropriated, for testing the capacity and usefulness of the said system of electro-magnetic telegraphs invented by your orator, Morse, for the use of the Government of the United States, by constructing a line of said electro-magnetic telegraphs under the superintendence of your

orator, Morse, of such length and between such points as should fully test its practicability and utility, and that the same should be expended under the direction of the Secretary of the Treasury, upon the application of your orator, Morse; and the said Secretary of the Treasury was further authorized, by said act, to pay out of said thirty thousand dollars to your orator, Morse, and the persons employed under him, such sums of money as he should deem to be a fair compensation for the services of your orator, Morse, and the persons employed under him, in constructing, and in superintending the construction of the said line of telegraph authorized by said act as by the act will more fully appear.

And your orators further show, that in pursuance of said act a line of telegraph was constructed under the superintendence of your orator, Morse, between the city of Washington, in the District of Columbia, and the city of Baltimore, in the State of Maryland; that the said line was completed so that the same was used for the transmission of intelligence thereon and thereby between Baltimore and Washington, in the course of the year one thousand eight hundred and forty-four; that the said line was constructed so as to be worked and operated by means of the said improvement, which had been at that time patented as aforesaid by your orator, Morse; and that the same, when so completed, was continued to be worked and operated under the direction and superintendence of your orator, Morse, and your orator, Vail, by means of the said improvement, until the said letters patent of the eleventh day of April, one thousand eight hundred and forty-six, were granted; and after that time the same was, and has continued to be until the present time, operated, and the accurate communication of intelligence, public and private, between Washington and Baltimore, on said line, is accomplished in a space of time practically inappreciable by means of the said several improvements so patented by your orator, Morse, and by no other means whatever.

And your orators aver that the capacity, practicability, and usefulness of the said system of electro-magnetic telegraphs, so invented by your orator, Morse, and so patented by him as aforesaid, have been fully and successfully tested and established by the working and operation of the said line between Baltimore and Washington; and that they have been also fully proved by the working of a line from New York to Buffalo, from Louisville to Maysville, Kentucky, and of many other lines.

And your orators further show unto your honors, that after the practicability and usefulness of the said invention had been fully established by the successful working of the said line from Baltimore to Washington, it was purposed and intended, by the proprietors of the said patented improvement, to form joint stock associations, of which the persons owning the said several letters patent should be members, and of the capital stock of which respectively they were, by the respective articles of association of such joint stock companies, to have a certain portion, each in proportion to his interest in said letters patent; such portions of capital stock to be paid for by such proprietors, by the license by them

respectively to such joint stock associations of the exclusive right to construct and use the said patented improvements on the lines respectively designated in the said articles of association of such companies; and the objects of said several associations were to construct and carry a line of telegraphic communication between different places in the United States, to be constructed and worked according to the improvement so patented by your orator, Morse.

And your orators further show unto your honors, on information which they believe to be true, that by means and agency of such associations as are thus above described, continuous lines of telegraphic communication have been constructed from New York to the said city of Washington, embracing the said original line from Washington to Baltimore, from Boston to the city of New York, and from New York to Buffalo, and other lines within the United States, embracing in the whole of these lines an aggregate length of more than 4,500 miles. Among these is a line of telegraphic communication from Washington city to New Orleans, and various side and shorter lines have been built in the United States; on all of which lines your orators say, on information which they believe to be true, that the said patented improvements of your orator, Morse, are used, and are now in successful operation for the transmission of intelligence.

And your orators further show, on information which they believe to be true, that many extensions of, and additions to, the said lines of telegraphic communication are in the course of construction in various parts of the United States, with their license and permission, for considerations given to them, so as to extend more widely the benefits of the said invention. And your orators believe that, if they are protected in the lawful use of their rights, every section of the United States will shortly participate in the advantages of the said patented improvements. Your orators have not at any time been disposed to withhold the use of their privileges and property under the said letters patent; but, on the contrary, always have been and still are willing to extend the same upon reasonable terms. And your orators state, on information which they believe to be true, that on all the lines of telegraphic communication now successfully operating in the United States, in transmitting intelligence by means of electro-magnetism, the patented improvements of your orator, Morse, or the chief and essential principles and parts thereof, are used. And your orators do further say, that the said patented inventions of the said Morse are of great utility to mankind, and the property therein is of great value.

Your orators further show unto your honors, that they have caused to be constructed a line of telegraphic communication from Louisville, in the district of Kentucky, to Maysville, in the said district, which is now successfully operating in the transmission of intelligence by means of the patented improvements of your orator, Morse.

And your orators further show unto your honors, that they have also caused to be constructed a line of posts and wires from Louisville, in

the district of Kentucky, by way of Bardstown, New Haven, Glasgow, and Scottsville, in said district, and Gallatin, in Tennessee, to Nashville, in the said last named State, for the transmission of intelligence by means of the patented improvements of your orator, Morse; that they have expended large sums of money thereon; that said line is in a course of extension to New Orleans, in the State of Louisiana, and is connected with Memphis, in Tennessee, by another line. That other large sums of money will be expended in the completion of the said line, which your orators expect will be effected in a short time. That telegraphic communications have already been made between Louisville and Nashville upon said line, and your [orators] expect that it will soon be in continued and successful operation.

Your orators further show unto your honors, that they have been in the undisturbed use of the invention of your orator, Morse, and have uninterruptedly enjoyed the rights granted and secured to him by his said letters patent from the issuing thereof till the committing, by the defendants, of the grievances hereinafter mentioned. That the said rights have been repeatedly and explicitly acknowledged and admitted in divers ways, and by individuals and large bodies of associated citizens in various sections of the United States. That these have treated with your orators for the purchase of their rights or parts thereof, and of licenses to use the said patented improvements; and that your orators have made extensive sales or licenses to use said improvements to companies and individuals upon various lines, and amongst others, to the New York, Albany, and Buffalo line, the Washington and New York line, the New York and Boston line, the Washington and Petersburg line, the line from Petersburg to New Orleans, besides numerous shorter and side lines.

And your orators further show unto your honors, that the said defendant, Henry O'Rielly, did himself acknowledge the rights of your orators under the said letters patent, granted to your orator, Morse, by negotiating for rights or licenses to use the said improvements, and by entering into a contract with your orators and the said Leonard D. Gale, then interested in the said letters patent, on the thirteenth day of June, one thousand eight hundred and forty-five, a true copy of which is filed as a part of this bill. Your orators charge that the said O'Rielly did often, in various ways and for a long period of time, manifest his acquiescence in, and admission of, the rights and privileges of your orators; and as especially showing such admission, your orators state that he did, on the twenty-fourth day of October, one thousand eight hundred and forty-six, write and address to your orator, Smith, a letter, which he received, of which a true copy is as follows, viz:

LANCASTER, *October* 24, 1846.

Hon: F. O. J. SMITH.

DEAR SIR: After a thorough examination of the contract and of the testimony in our possession, neither my associates nor myself are able to perceive that there is any forfeiture on our part. It is proper to ob-

serve that those associates include several lawyers, four of whom are among the prominent counsellors of the State of New York, and "the law and the testimony," as well as the contract and the rights acquired by them and others under that contract, have been most carefully considered; considered, not now merely, but steadily kept in view from the commencement to the end, that every thing which the spirit, as well as the letter of the contract contemplated, might be faithfully discharged. Setting aside any consideration of my own efforts, I may say that my associates are generally men who neither rashly embark nor readily abandon an enterprise, being always careful to know that the progress of their efforts, as well as the origin and object of those efforts, are in accordance with justice and honor. In their hands, sustained by their talent, character, and property, the rights and duties under my contract, (which is their contract also,) have been, and will be, most sedulously considered; for they esteem that contract quite as sacred as the patent; and will unite with the patentees in maintaining both with equal energy, whenever either may be assailed, in any form or place. It will not be their fault if the faith, and honor, and justice which should characterize the telegraph system in its aspirations for public confidence, are violated or assailed.

Yours, respectfully,
HENRY O'RIELLY.

Your orators further show unto your honors, that the said defendant, Henry O'Rielly, has, by himself, his agents, and servants, erected a line of posts, and suspended metallic wires thereon, from the city of Louisville, in the district of Kentucky; by the way of Bardstown, to Nashville, in the State of Tennessee, and well knowing all the facts herein before set forth, the said defendant O'Rielly, and the said other defendants in combination with him and under his direction, have, without any grant or license therefor, and against the will of your orators, worked and operated, and are now working and operating, the said line as a line of telegraphic communication by means of electro magnetism, and by means of the said several improvements so patented by your orator, Morse, or by means of some of them, and by no other means whatever; and in which working and operation of said line, they use and employ instruments, apparatus, and means, which are in the material, substantial, and essential parts thereof, like to and upon the principle and plan of the said several improvements so patented by your orator, Morse, as aforesaid; or like to and upon the principle and plan of some of said improvements, and not other or different; and by such means the defendants, their agents, and servants, have been for the space of more than four months past, and are now, transmitting intelligence over said line for any person who may desire the same to be done, and for such service have been, and now are, receiving compensation from the persons for whom the same is performed. All which is in violation of the said several letters patent, and of the specifications thereto annexed, or of some part thereof. And the said defendants re-

fuse to desist from the use of the said patented improvements, and from the violation of your orators' rights.

Your orators further shew, that as they are informed and believe, that the said defendants have received and are now receiving considerable sums of money for the said services so rendered by the means aforesaid, and in violation of their rights; and they believe and charge that unless restrained they will make large sums of money to the great diminution of the business and profit of the line between the same points, which your orators have caused to be built, and to the great damage of your orators.

Your orators further state, that they are informed and believe, and they charge the fact to be, that the said defendant, O'Rielly, is extending the line aforesaid from Nashville to New Orleans, in the State of Louisiana; also, he has extended it from Nashville to Memphis, in the State of Tennessee, and your orators are informed that he is operating upon the said last mentioned line to Memphis, in violation of their rights, by the use of the said patented improvements, or the chief and essential parts and principles thereof. Your orators are not advised of the progress which said defendant has now actually made towards the completion of the said extension to New Orleans. They are informed that he has made progress towards the same; and that he declares that he will finish the said line the whole way from Louisville to New Orleans, and use the same when finished, which will be in violation of your orators' rights, as he is now using the said line from Louisville to Nashville.

Your orators further show unto your honor, that the said line of telegraph from Louisville to Nashville, so as aforesaid operated upon by the said defendants, their agents and servants, is from its commencement at Louisville to the point where it leaves the State of Kentucky, and enters the State of Tennessee, wholly within the district of Kentucky, and within the jurisdiction of this honorable court, and that the apparatus and machinery for transmitting and receiving intelligence at the Louisville end of said line is used within the district of Kentucky, to wit, at Louisville aforesaid.

Your orators cannot with certainty state the amount of profits unlawfully derived by the said defendants from the aforesaid violations of their rights upon said line. And they ask that said defendants may be required to make a full disclosure of, and to account for, all such profits. Your orators further show unto your honors, that they are informed that the said defendant, O'Rielly, in excuse of his violations of the letters patent issued to your orator, Morse, has sometimes given out and pretended that he had a right to do what he has done, and yet continues to do in the premises, derived from the contract hereinbefore set forth, between said O'Rielly and your orators, and said Gale, of the thirteenth June, one thousand eight hundred and forty-five. Whereas your orators submit to your honors, that the said contract does not give any such right, nor can it be construed to embrace within its provisions which authorized the said defendant, O'Rielly, to raise joint stock com-

panies, the line of telegraphic communication from Louisville, in Kentucky, to New Orleans, in Louisiana; that said contract only authorized said defendant, O'Rielly, to raise capital by which to construct lines of telegraph, and your orators believe and are advised to say, that the said contract has become void by the said defendants' disregard of its provisions and non-performance of its conditions.

And your orators are informed that the defendant, O'Rielly, and the other defendants sometimes give out and pretend that the said patented improvements are void, and that your orators have no right to the privileges secured thereby; whereas your orators charge that the patents issued as aforesaid to your orator, Morse, are good, valid, and sufficient in law, and that the said defendant, O'Rielly, is estopped from making any such pretence by the execution of said contract of June thirteenth, one thousand eight hundred and forty-five, and by reason of his proceeding to execute the same as shown in his letter hereinbefore set forth; the claims and pretenses set up in which letter by said defendant, O'Rielly, your orators do not admit, by thus showing the same as evidence of his admission of the rights of your orators.

And your orators further say, that the said defendants at other times give out and pretend "that the machinery and apparatus which they use as aforesaid for the transmission and reception of intelligence upon the said line is a distinct and separate invention, which your orators are informed they call the Columbian telegraph. Whereas your orators charge that the said pretended new invention is in its essential principle identical with and upon the plan of the patented improvements of your orator, Morse, and that the use of the same as herein charged is a violation and infringement of the patents issued to your orator, Morse."

And your orators are informed that the said defendants have at other times given out and pretended that your orators had parted with, assigned, and transferred their rights under the said letters patent, in respect to the line from Louisville to New Orleans, to one Eliphalet Case, in the State of Ohio, and that by him the same was conveyed in trust to J. C. Wright, L. Worthington, George S. Coe, and Abel C. Thomas, of said State; respecting which your orators say, that with the view of having capital raised for the purpose of constructing certain lines of telegraph in the valley of the Mississippi by joint stock association, and for no other consideration, they did on the twenty-first day of December, one thousand eight hundred and forty-five, enter into a contract with said Case, by which they conveyed to him the right to use said patented improvements on said lines, including the line from Louisville to New Orleans, with power to transfer the same to others to hold with him in trust for the benefit of contributors of capital, and of your orators in joint stock association to build said lines of telegraph. And that pursuant to said power said Case did make such conveyance to said Wright, Worthington, Coe, and Thomas, on the twenty-first day of January, one thousand eight hundred and forty-seven. But your orators state, that what was contemplated by them and the said individuals in the making of said contracts was not effected, and the objects of said

trust having failed the same became useless, and the said trustees became desirous to close and cancel it. And accordingly for that purpose the said Case, Wright, Worthington, Coe, and Thomas, (the two latter by their duly authorized attorney, J. C. Wright,) did on the tenth day of December, one thousand eight hundred and forty-seven, by their deed of that date, which has been duly recorded in the Patent office, reciting their intent to be to cancel said trust, did thereby fully and absolutely cancel said deed of trust, and did release to your orator, Smith, all the rights held by them in trust. Your orators are advised that before the execution of the said last mentioned deed the said trustees held their rights in trust solely for your orators, the purposes for which the deeds to them were made having wholly failed; and that your orator, Smith, under his release from them, would hold the same in trust for them to the extent of their respective interests in said patented rights. Your orators, however, further show that your orator, Smith, acknowledging as he always did and now does, the interests of your orators, Morse and Vail, in proportion as aforesaid, did for the purpose of more explicitly establishing and declaring the same, on the twenty-fifth March, one thousand eight hundred and forty-eight, by his deed of that date, a true copy of which is filed herewith as part of this bill, formally transfer to your orator, Morse, ten sixteenths, and to your orator, Vail, two sixteenths (he holding four sixteenths) of whatever rights he acquired under the release of the said trustees, Case and others, within the territory mentioned in said release; and so your orators are advised to say, that the rights under the said letters patent are within the said territory, in the same plight and condition in which they were prior to the deed of your orators to said Case. Your orators file herewith a certified copy from the records of the Patent office of the said deed of Case and others to your orator, Smith; also a certified copy from said office of said deed of your orator, Smith, to your orators, Morse and Vail, and pray that they may be taken as parts of this bill. All which actings, doings, and pretenses of the said defendants are contrary to equity and good conscience.

To the end, therefore, that the said defendants may, if they can, show why your orators should not have the relief hereby prayed for, and may, upon their several corporal oaths, and according to the best of their several and respective knowledge, remembrance, information, and belief, full, true, direct, and perfect answers make to such of the interrogatories hereinafter mentioned and set forth, as by the note hereunder written they are respectively required to answer, that is to say:

1st. Whether your orator, Morse, was not the true and original inventor of the improvements patented by him as hereinbefore set forth; and if not, how is the contrary made out, and who invented the same?

2d. Whether said inventions are not of great, or some, public utility; and if not, why?

3d. Whether the letters patent hereinbefore mentioned were not duly made and granted to your orator, Morse; and if not, why?

4th. Whether said letters patent are not valid and sufficient in law; and if not, why?

5th. Whether the transfer and assignments, hereinbefore mentioned to have been made by your orator, Morse, and said L. D. Gale, of interests in said patented rights, were not made as stated; and whether the respective interests and titles of your orators in said rights are not as alledged herein; or if not, why?

6th. Whether the said patented improvements of your orator, Morse, have not been used and put in practice, and now used, as herein set forth?

7th. Whether sales of, and licenses to use, said rights have not been made and granted as herein set forth; or if not, how is the contrary made out?

8th. Whether the extensions of lines of telegraphic communication worked by the said patented improvements have not been made, and are not now in progress, and to the extent stated herein; if not, how is the contrary made out?

9th. Whether your orators have not made profits, by said sales or licenses, to some extent; and if not, how is the contrary made out?

10th. Whether the said defendants, or some of them, or some one in their behalf, have not worked, used, or put in practice, and are not now working, using, or putting in practice, the said patented improvements of your orator, Morse, or some part or parts of the same, or the essential principles thereof, or some of them; and how such conduct is justified?

11th. Whether the machinery and apparatus, used as aforesaid by said defendants, or some of them, is not in every or in some respect a violation, or infringement, or evasion of the patented rights of your orators; or if not, why?

12th. Whether the said defendants, or some of them, have not made and received considerable, or some and what, moneys and profits, and to what amount in the whole, and how such conduct is justified; and whether they are not still receiving gains and profits?

13th. Whether the said defendants, or any of them, have had any license from your orators, or either of them, in the premises?

14th. Whether the said defendants, or some of them, have not, by the ways and means aforesaid, or by others and what ways, violated, infringed, or evaded the letters patent granted to your orator, Morse?

15th. Whether it is not the fact that, by means of the infringement or evasions aforesaid, your orators have not sustained heavy, or some and what, loss or injury?

16th. Whether the copy of the contract filed with this bill, dated June 13, 1845, is not a true copy; and whether the defendant, O'Rielly, did not sign the same?

17th. Whether the defendant, O'Rielly, did not write to your orator, Smith, the letter, of which a copy is set out in this bill; and whether the same is not a true copy of said letter?

18th. Whether the release and transfer herein set forth as having

been made by Case, Wright, and others to your orator, Smith, and by him to your orators, Morse and Vail, were not made as stated?

And that the defendants may be compelled to account for and pay over to your orators the income thus unlawfully derived by them from the violation of the rights of your orators, as above set forth; and that the defendants, their workmen, servants, and agents, may be restrained, as well by the preliminary and immediate order and injunction, as by the final and perpetual injunction and decree of this honorable court, from using, operating, or employing the said patented improvements, or either of them, or any part thereof, and from using and operating with instruments and apparatus in substantial and essential parts like to and upon the plan of the patented improvements of your orator, Morse, or any of them, on the said line of telegraph so constructed and put in operation, by the said defendants, from Louisville to Nashville, so far as the same is within the jurisdiction of this court; or any other line of electro-magnetic telegraph on the said route from Louisville to Nashville, so far as the same may be within the jurisdiction of this court; and from infringing upon, or violating, or evading your orator's rights in the said patented improvements any way whatever; and that your orators may have such further relief as the equity of the case may require, and to your honors may seem meet. May it please your honors to grant to your orators a writ of subpœna, directed to the said Henry O'Rielly, Eugene Witman, and W. F. B. Hastings, and commanding them to appear and make answer unto this bill of complaint, and to perform and abide by such order and decree therein as to the court may seem required by the principles of equity and good conscience.

SAML. F. B. MORSE,
FRANCIS O. J. SMITH,
ALFRED VAIL.
P. S. LOUGHBOUROUGH,
Of counsel for complainants.

The defendant, H. O'Rielly, is required to answer the interrogatories in the foregoing bill, numbered from one to eighteen, inclusively. The defendants, Witman and Hastings, are required to answer the interrogatories numbered from one to eighteen, inclusively, except numbers 16 and 17.

P. S. LOUGHBOROUGH,
Counsel for complainants.

UNITED STATES OF AMERICA,
District of Columbia.

On the first day of August, eighteen hundred and forty-eight, came before me Samuel F. B. Morse, of New York, one of the complainants in the foregoing bill in chancery against Henry O'Rielly and others, who is known to me, and has signed said bill; and being duly sworn deposeth and saith, that he verily believes he was the original, true, and first inventor of the American electro-magnetic telegraph, and the

improvements therein, as described in the letters patent issued to him by the United States therefor, and reissued as set forth in said bill. He doth further state, that he has heard the said bill in chancery read, and knows the contents thereof; that the matters thereof, so far as they are stated upon his own knowledge, are true; and so far as upon the information of others, he believes them to be true.

T. HARTLEY CRAWFORD,
Judge of the criminal court of the District of Columbia.

UNITED STATES OF AMERICA,
District of Columbia.

On this first day of August, 1848, before me, came Francis O. J. Smith and Alfred Vail, two of the complainants in the foregoing bill, who are known to me, and who have signed the said bill, and being sworn depose and say, that they have heard said bill read, and know its contents; that the matters thereof, so far as stated upon their own knowledge, respectively, are true; and so far as on the information of others to them respectively, they believe to be true. They do further state, that they do verily believe that their co-complainant, Samuel F. B. Morse, was the original, first, and true inventor of the new and useful improvements in electro-magnetic telegraphs described in the letters patent set forth in the foregoing bill, and that their titles under said letters patent are correctly set forth in said bill.

T. HARTLEY CRAWFORD,
Judge of the criminal court of the District of Columbia.

DISTRICT OF COLUMBIA,
Washington county, to wit:

I, William Brent, clerk of the circuit court of the District of Columbia, for the county of Washington, hereby certify, that the Hon. T. Hartley Crawford, before whom the foregoing affidavit was made, and who has thereto subscribed his name, was at the time thereof judge of the criminal court of the District of Columbia, duly commissioned and qualified.

In testimony whereof I have hereunto subscribed my name and affixed the seal of said court, this 2d day of August, 1848.
[SEAL.]
W. BRENT, *Cl'k.*

The following is the injunction bond executed by the complainants herein, to wit:

Injunction bond.

Know all men by these presents, that we, Dandridge S. Crockett and William Tanner, are held and firmly bound unto Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, in the penal sum of five thousand dollars; for the payment of which we bind ourselves and our heirs, jointly and severally, firmly by these presents. Sealed with our seals this eleventh day of September, 1848.

The condition of the above obligation is such, that whereas Samuel F. B. Morse, F. O. J. Smith, and Alfred Vail, have on their bill to be filed in the circuit court of the United States for the district of Kentucky, against the obligees, O'Rielly, Whitman, and Hastings, obtained an act of the judge of the United States for said district, whereby "It is ordered that the defendants, Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, shall be and they are hereby enjoined and commanded that they and each of them, their servants and agents, do henceforth desist and refrain from all further employment within the district of Kentucky, of the electro-magnetic telegraph in the complainants' bill mentioned, and which it appeared on the proofs was by them, the defendants, lately employed, as by the complainants alleged; and of the telegraph by the defendant, O'Rielly, in his answer described, and which it is therein represented was at the time of his answer employed by the defendants, and by them called the Columbian telegraph, but which is here considered for the purposes of this matter one and the same telegraph in *in* the transmission of intelligence which is in one place to another distant place, by making thereat a legible record thereof. And from such employment for such purpose of any other telegraph worked by the motive power of electro-magnetism, and consisting of combined circuits of electricity, connected by what is called by the complainants a receiver or receiving magnet, and by the defendants the mutator and the register, worked by electro-magnetism in whole or in part, in any mode or in any combination or combinations within the exclusive rights as here expounded, granted by the letters patent to the complainant, Sam'l F. B. Morse, until this order shall have been discharged or the effect thereof shall have expired," upon the condition of giving such bond as is in said order prescribed, which is this bond.

Now, if the complainants shall prosecute their suit with effect, and obtain a final decree in conformity to this order of injunction, or in case it shall hereafter appear that the injunction is wrongfully obtained, and it shall be dissolved or discharged, and the complainants shall thereupon pay to the said O'Rielly, Whitman, and Hastings, all damages and costs which they or either of them shall thereby have suffered, then this obligation to be void, else to remain in full force and virtue.

DANGE. S. CROCKETT, [SEAL.]
WILLIAM TANNER. [SEAL.]

Approved and signed, sealed and delivered in the presence of—
THOS. B. MONROE,
J. U. S. Dist. Ky.

The following is the subpœna issued herein, to wit:

Subpœna in chancery.

[SEAL.] The United States of America to the marshal of the Kentucky district, greeting:

You are hereby commanded to summon Henry O'Rielly, Eugene

L. Whitman, and W. F. B. Hastings, to appear before the judges of our eighth circuit court of the United States of America, in and for the district of Kentucky, at the Capitol, in Frankfort, on the 1st Monday in November next, to answer a bill in chancery, exhibited in our said court by Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith; and this they shall in nowise omit under the penalty of four hundred dollars. And have then there this writ.

In testimony whereof, Roger B. Taney, esq., chief justice of the Supreme Court of the United States of America, hath caused the seal of our said court to be hereunto affixed, this 12th day of September, A. D. 1848, and in the 73d year of our independence.

Attest: JNO. H. HANNA,
C. C. C. K. D.

(Marshal's return, to wit:)

Marshal's return.

Executed this 15th day of September, 1848, on Henry O'Rielly and Eugene L. Whitman, two of the defendants herein named, by delivering to each of them a true copy of this subpœna and injunction. The within named defendant, W. F. B. Hastings, not found, being no inhabitant of this district.

R. N. LANE, *Dep. Mar.*
For JOHN LANE, *M. K. D.*

The writ of injunction is as follows, to wit:

Writ of Injunction.

The United States of America, to Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings.

Whereas it is represented in our circuit court of the eighth circuit and district of Kentucky, on the part of Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, complainants, in the bill against you, the said Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, defendants thereto, that they, the complainants, were, and are by our letters patent, duly issued to Samuel F. B. Morse, and by his partial assignment to his co-complainants, lawfully invested with the exclusive right of making, using, and vending the electro-magnetic telegraph, with the improvements therein, in the several letters patent described, for the terms therein mentioned, and not yet expired; and that you, Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, in violation of their rights so granted and held, had, within the district of Kentucky, employed and used a telegraph, in law substantially the same, to their great damage, and would persist in such violation unless restrained; and the matter of such complaint having been duly heard, on a motion before our judge in and for the district of Kentucky, one of the judges of our said court, at his chamber, it was found and considered that the complainants had, by the aforesaid letters patent, and as by them represented, the exclusive right in their

bill alleged, and that you, the defendants, had infringed, and would persist in the infringement and violation thereof

You, Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, are therefore, as by the order of our said judge in the premises are directed, enjoined, and commanded that you, and each of you, your servants and agents, do henceforth desist and refrain from all further employment in the district of Kentucky of the electro-magnetic telegraph in the complainants' bill mentioned, which it appears by the proofs was by you, the defendants, lately employed; and of the telegraph by the defendant O'Rielly in his answer mentioned, which is by you called the "Columbian telegraph," and which it appeared you proposed to employ hereafter, but which two are considered here, for the purpose of this matter, as one and the same telegraph, in the transmission of intelligence, which is in one place to another distant place, by making thereat a legible record thereof; and from such employment for such purpose of any other telegraph worked by the motive power of electro-magnetism, and consisting of combined circuits of electricity, connected by what is called by the complainants the receiver, and by you, the defendants, the mutator, and the register worked by electro-magnetism, in whole or in part, or in any combination whatever, within and in violation of the exclusive rights as here determined, granted by the letters patent to the complainant, Samuel B. F. Morse, until the further order of the court, or until the effect of the said order of our judge at his chamber shall have expired.

In testimony whereof Roger B. Taney, esq., chief justice of the Supreme Court of the United States of America, hath caused the seal of our said court to be hereunto affixed this 12th day [L. S.] of September, A. D. 1848, and in the 73rd year of our independence.

Attest: JNO. H. HANNA, *C. C. C. K. D.*

(Marshal's return, to wit:)

Executed this 13th day of September on Henry O'Rielly and Eugene L. Whitman, two of the defendants herein named, by delivering a true copy of this subpœna and injunction to each of them. The within named defendant, W. F. B. Hastings, not found, being no inhabitant of this district. 1848.

R. N. LANE, *Dep't. M.*,
For JOHN LANE, *M. K. D.*

Order filing answer of O'Rielly.

And afterwards, to wit, at rules held in the clerk's office before the clerk on the 2nd day of October, 1848, on motion of the defendant, Henry O'Rielly, esq., by his counsel, Henry Pirtle, esq., his answer, accompanying the bill whereon the injunction was awarded at the judge's chamber, is filed.

Which answer is as follows, to wit:

1770.

Answer of H. O'Reilly.

The circuit court of the United States, for the eighth circuit and district of Kentucky.

The answer of Henry O'Rielly to the bill of complaint of Samuel B. F. Morse, of New York, Alfred Vail, of New Jersey, and Francis O. J. Smith, of Maine, complainants, against the said Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, defendants.

The defendants, saving all manner of exception on account of the manifold errors, and imperfections, and insufficiencies in said bill of complaint contained, for answer thereto, or to so much thereof as he is advised is material to be answered by him, maketh answer and saith, as follows: To the first special interrogatory he answers and says, that, from information and belief he admits Samuel F. B. Morse was the inventor of the port rules, type, type rules, the system of machinery for working and using said type, and also of the dictionary or vocabulary of words regularly numbered, of his peculiar combination of dots and lines for representing numerals and letters, and of his peculiar combinations of mechanical instruments and galvanic or electric power for transmitting, printing, and recording telegraphic signals, all as set forth and described in the specifications of the several patents referred to in said bill of complaint; but he does not believe or admit that said Morse is the inventor or discoverer of any of the other improvements described in the specifications of said several patents. He states that each and every of the powers and mechanical instruments, except said port rules, type, and type rules, described in said specifications, taken separately, are of more or less ancient discovery and invention, or the invention of others than said Morse.

He denies that said Morse is the inventor of the use of the motive power of electro-magnetism, however developed, for making or printing intelligible characters as signs of letters or numbers; on the contrary, he states that, as early as 1837, Dr. Steinheil, professor of mathematics and natural philosophy at Munich, in Germany, had actually put into operation a line of telegraphic communication between Munich and Bogenhausen, in Germany, a distance of six miles. Said Steinheil made use of the motive power of electro-magnetism in transmitting, marking, and printing intelligible characters, signs of letters, and numbers; which characters were marked or printed on paper, or other suitable material, which was passed by a system of clock work under the pens, or marking levers; which levers being worked by the power of electro-magnetism, made upon the paper series of dots, the combinations of which represented letters and numbers. In fact this defendant charges that the method of said Morse, and of Dr. Steinheil, bore a close resemblance to each other in almost every essential particular; the only material difference being that the said Morse made use of the attraction of the electro-magnet as his motive power, and Dr. Steinheil of deflection, caused in a magnetic needle or bar by a current of galvanism or electricity, as his motive power.

Defendant further charges, that, before the discoveries of Morse and Steinheil, the method or art of transmitting and exhibiting intelligible characters had been discovered by others, and Dr. Steinheil had discovered a mode of marking or printing said characters by the motive power of electro-magnetism; and he charges that the discovery of said Dr. Steinheil was anterior to that of said Morse, and that his method, described in a printed publication, to wit, in Sturgeon's Annals of Electricity, before Morse had made application for a patent, in the manner and according to the requirements of the statute on this subject, such application not being made, as he is advised, until 1840. Nor does he admit that said Morse was the inventor of the contrivance for the combination of two or more batteries and independent circuits for transmitting telegraphic signals to any distance; said contrivance having been really invented by Edward Davy, of England, and patented to him before said Morse had made an application for a patent, in the manner, and according to the requirements of the statute on that subject; neither was he, the said Morse, the inventor of what he calls the "receiving magnet and local circuit," said contrivance being the same in principle with the contrivance for the combination of two independent batteries and circuits, which was invented and patented by Edward Davy, as before mentioned, and not differing from it in any material or essential particular.

To the second special interrogatory he answers and says, that he admits the invention made by said Morse, as set forth in his response to the first interrogatory, *are* of some utility.

To the third special interrogatory he answers and says, that he admits the issuing of the several patents to said Samuel F. B. Morse, at the times and in the manner set forth in the bill of complaint. He refers to the copies of said patents filed with said bill of complaint, as best showing whether or not they were duly issued according to law.

And the said defendant in answer to the 4th interrogatory, "whether the said letters patent are not valid and sufficient in law, and if not, why," says, as he is advised, said letters patent are not valid and sufficient in law; and the said defendant, further answering the 4th interrogatory, says, *says*, that the letters patent originally issued on the 20th of June, 1840, re-issued on the 15th January, 1846, and again re-issued on the 13th of June, 1848, are, as he is advised, invalid and insufficient in law, in this, to wit:

1st. That the said Samuel F. B. Morse claims, in the specifications annexed to the said letters patent, the exclusive use of the motive power of the electric or galvanic current, however developed, for marking or printing intelligible characters, signs of letters, at any distance, being, as he claims, a new application of that power, and by express terms not limiting himself to any specific machinery, or parts of machinery.

2d. That the said Samuel F. B. Morse, in the 5th and 6th claims stated in the specification annexed to said letters patent, and the description corresponding thereto, claims a system of signs representing

numerals, and a system of signs representing letters, neither being, as the defendant is advised, a proper subject-matter of a patent.

3d. That the said Samuel F. B. Morse was not the original and first inventor or discoverer of several substantial and material parts of the subject of said letters patent, and claimed as new in the specification thereto annexed, as is more fully set forth and stated in the answer to the first interrogatory.

4th. That the specification annexed to the said letters patent do not describe the alleged invention or discovery in such full, clear, and exact terms, as to enable any person, though skilled in the art to which it relates, to construct and use the same.

5th. That, in the said specification annexed to the said letters patent, the said Samuel F. B. Morse claims and states, that the machinery therein described will make certain marks in the shape of the teeth of a saw, as signs of numerals, when, in fact, as will appear from the description of said machinery, and the drawings referred to, no such marks can be made as claimed and stated in such specification.

6th. That the said Samuel F. B. Morse presented to the Commissioner of Patents of the United States an application, in writing, for the said original letters patent, bearing date on the 5th day of April, 1838, accompanied with a specification, bearing date on the 7th day of April, 1838; that the said specification did not, as this defendant believes and charges, then contain the words following, to wit: "to extend more effectually the length of any desired circuit of conductors, and to perpetuate the power of the electric or galvanic current equally throughout the same, I adopt the following mode, and also for connecting and using any desired number of additional and intervening batteries or generators of said current, and for connecting, progressively, any number of consecutive circuits, viz., place at any point in a circuit an electro magnet of the denomination already described, with an armature upon a lever of the form and structure, and in the position of that used at the register to hold and operate the marking instrument, with only a substitution therein for such marking instrument of a forked wire A., exam. 9, fig. 3, like that upon the end of the signal lever heretofore described. Directly beneath the latter wire place two cups of mercury, EE, or two metallic plates joined to terminations of a circuit, led in from the fresh or additional battery or generator of said circuit, in the same manner as they are to be provided in the first circuit of conductors, at the points where the cups of mercury are hereinbefore described. As the current in the first circuit acts upon the magnet thus provided, the armature thereof and lever are thereby moved to dip the forked wire A in the cups of the second circuit, as in the circuit first described. This operation instantly connects the break in said second circuit, and thus produces an additional and original power or current of electricity or galvanism from the battery of the said second circuit, to the magnet or magnets placed at any one or more points in such circuit, to be broken at pleasure as in the first circuit; and from thence, by the same operation, the same results may again be repeated, extending and

breaking at pleasure such current through yet another and another circuit, ad infinitum, and with as many intervening registers for simultaneous action as may be desired, and at any distance from each other." The same being a description of an important and material part of the alleged invention and discovery, and intended to be embraced in the 8th claim in the specification annexed to the said application. That the said device or improvement thus described was, as this defendant believes and charges, then unknown to the said Samuel F. B. Morse, is not referred to in any description or communication made by the said Samuel F. B. Morse, in relation to his said alleged invention or discovery, prior to the said 7th day of April, 1838, and no reference whatever is thereto made in the caveat, a copy of which has been filed in this cause. That the said specification was, on the 14th day of May, 1840, returned to the said Samuel F. B. Morse, by the said Commissioner of Patents, for a correction to be made therein.

That afterwards, and before the 20th day of June, 1840, the said Samuel F. B. Morse, as this defendant believes and charges, inserted in said specification the description contained in the words before recited, still retaining the original dates of the said application and specification. That on the 4th day of July, 1838, one Edward Davy obtained from the Queen of the united kingdom of Great Britain and Ireland letters patent for an invention very similar to, and intended to effect the same purpose as the devices and improvements described in the said specification of the said Samuel F. B. Morse, as before recited; that the said Samuel F. B. Morse, as this defendant believes and charges, at the time of said alteration of said specification, well knew that said invention had been made and a patent granted therefor to the said Davy, and intended by such alteration to avoid the effect of the granting of the said patent to the said Davy by claiming an invention prior to the date thereof.

And the said defendant further answering the said 4th interrogatory says, that the said letters patent, originally issued on the 11th day of April, 1846, and renewed on the 13th day of June, 1848, are, as he is advised, invalid and insufficient, in this, to wit:

1. That the said letters patent were granted for an improvement on a machine or invention before known and patented in the United States; and the specification annexed to the said letters patent does not clearly and sufficiently show in what said improvement consists, or distinguish what is new in said machine or invention, to which said improvement is applied, from that which was before known and patented.

2. That for the part of the said alleged improvement embraced in the first claim stated in the said specification, and the description corresponding thereto, a patent had before been granted to the said Samuel F. B. Morse on the 20th day of June, 1840; that the change in the use of said improvement as described in the said specification is a mere change of position or proportion, or formal variation.

3. That the said Samuel F. B. Morse was not the original and first inventor of the part of said alleged improvement embraced in the first

claim stated in the said specification, and the description corresponding thereto, as is more fully set forth in the answer to the first interrogatory.

4. That the improvement for which said letters patent were granted was in public use in the United States prior to the application of the said Samuel F. B. Morse for a patent therefor, with the consent and allowance of the said Samuel F. B. Morse; that the same was so used on a line of telegraph from the city of Washington to the city of Baltimore, to the knowledge of Henry J. Rogers, of the city of Baltimore, Maryland, Charles F. Smith, of Nashville, Tennessee; on a line of telegraph from Philadelphia to New York, to the knowledge of the same persons, and of James D. Reid, of the city of Philadelphia; on a line from Albany to Utica, to the knowledge of Edmund F. Barnes, of the village of Geneva, and State of New York; and on a line of telegraph from Harrisburg to Lancaster, to the knowledge of said James D. Reid and David Brook, of Pittsburg, Pennsylvania, and Henry C. Hepburn, of Cumberland, Maryland.

5. That the improvement for which the said letters patent were granted was, prior to the application of the said Samuel F. B. Morse for a patent therefor, on sale with his consent and allowance; that the said Samuel F. B. Morse himself sold two machines with said improvements to the said defendant some time prior to the 30th day of January, 1846.

6. That the specifications annexed to the said letters patent do not describe the alleged invention or discovery in such full, clear, and exact terms as to enable any person, though skilled in the art to which it relates, to construct and use the same.

The said defendant further answering says, that he believes, and charges, that the said several letters patent, by reason of the matters before stated, or some of them, are null and void; and the said defendant insists, that if any part of the several alleged inventions or discoveries, described in said letters patent, shall be adjudged to be truly and bona fide the invention or discovery of the said Samuel F. B. Morse, the complainants have no right to avail themselves in this suit of the benefit of the act of Congress, approved on the 3d day of March, 1837, entitled "an act in addition to the act to promote the progress of science and useful arts. "As this defendant further insists and charges, that the said Samuel F. B. Morse, and the said complainants, have unreasonably neglected and delayed to enter at the Patent office the disclaimer required by the said act.

To the fifth special interrogatory he answers and says, that he admits the making of the several transfers and assignments by said Morse and said L. D. Gale in the bill of complaint alleged.

To the sixth interrogatory he answers and says, that he admits the patented improvements have been put in use and practice on the telegraphic line in the bill of complaint mentioned. He further states, that it appears by the date of one of the transfers in the bill of complaint mentioned, that one of the methods for putting the same into use

and practice was the transfer by said Morse to complainant, F. O. J. Smith, then chairman of the Committee of Commerce in the House of Representatives, of an interest in said Morse's invention ; shortly after which transfer, said Smith, as chairman of said committee, presented a report warmly and zealously urging upon the Congress of the United States an appropriation of thirty thousand dollars for putting into use and practice said telegraph of Morse, for the purpose of a test and experiment of its utility.

Further answering he says, that so far as he knows or believes, none of the machines or combinations described and claimed in the patent dated 20th June, 1840, and reissued as before mentioned, have ever been put in use or practice upon any line of telegraphic communication in the United States, except it may be the contrivance for the combination of two or more independent batteries and circuits in the modified form and manner of the receiving magnet and local circuit, and the marking lever and clock work.

To the seventh interrogatory he answers and says, that he admits the making of sales and licenses to use said patented improvements as stated in the bill of complaint.

To the eighth interrogatory he answers and says, that he admits that extensions of lines of telegraphic communication worked by said patented improvements have been made, or are in progress, to the extent stated in said bill of complaint.

To the ninth interrogatory he answers and says, that he admits and believes the complainants have made profits by their sales and licenses, and he considers the amount usually charged for such license, being equal in value to the entire cost of constructing said lines, as exorbitant and an imposition on the public. And further answering he states, that it was the effort made by complainants to extort from him and his associates that exorbitant profit, contrary to the terms of the contract made with him, and his firm resistance to such a demand, that produced the series of persecutions and denunciations with which complainants have ever since assailed him.

To the tenth interrogatory he answers and says, that the defendants have erected a line of telegraphic communication from Louisville, in Kentucky, to Nashville, in Tennessee; that said line was completed early in March, 1848, and ever since the 9th day of that month has been used by defendants in transmitting intelligence thereby; that on said line they do make use of currents of galvanism or electricity for transmitting and printing telegraphic signals, but not in the manner nor upon the principle of any of the patented machines, or combinations of said Morse. The moving power by which the telegraphic signals are written or printed by the machine used by the defendants being permanent magnets, and the currents of electricity or galvanism being used merely for changing the polarity of the armature of the instrument printing or marking said telegraphic signals, whereby the said instrument is alternately attracted and repelled by the permanent magnets. This defendant denies that this constitutes any infringement of

complainants' patented rights; and he denies that defendants, or either of them, have worked, used, or put in practice any other of said Morse's patented improvements on said line. He relies on the continued use of said machine from the 9th day of March, 1848, to this time by defendants, as a sufficient ground for refusing the special injunction prayed by complainants. He further states, that said line from Louisville to Nashville was nearly completed by defendants before complainants commenced making their line between the same points.

He also states that said telegraphic line of defendants has been continued and completed from Nashville to Tuscumbia, Alabama, and to Memphis, on the Mississippi river, and such progress has been made toward New Orleans, that the line to that point will be completed in the course of twenty or thirty days, whereby continuous lines from New Orleans to and through the principal points in the Mississippi valley to the cities on the Atlantic seaboard will be completed.

To the eleventh interrogatory he answers and says, that the machinery and apparatus used by defendants are not, as he believes, in whole or in part thereof, a violation, infringement, or evasion of the patented rights of complainants.

To the twelfth special interrogatory he answers and says, that the defendants have not made any profits on their said line from Louisville to Nashville, their expenses having exceeded their receipts.

To the 13th interrogatory he answers and says, that the defendants do not claim to have any license from complainants for using any of Morse's patented improvements on the telegraphic line from Louisville to Nashville.

To the 14th interrogatory he answers and says, he denies that the defendants have violated, infringed, or evaded in any manner the patented rights of complainants in their use and working of their telegraphic line between Louisville and Nashville.

To the 15th interrogatory he answers and says, he denies that complainants have sustained any losses by any violations, infringements, or evasions, of complainants' patented rights by defendants or either of them.

To the 16th interrogatory he answers and says, that he admits having made and signed the contract dated June 13th, 1845, referred to in the bill; he further states that when said contract was made defendant had never seen or examined the patent of said Morse; and although he afterwards made application to Amos Kendall for copies of the same, he never obtained, saw, or examined, said patent or a copy thereof, until December, 1846, at which time complainants had repudiated said contract, claiming the same to have been forfeited and vacated, and had actually instituted suit to enforce said forfeiture. The only patent in existence at the time his contract was formed was the original patent dated June 20th, 1840; the machines and combinations embraced in which, and claimed by said Morse, were not then, nor have at any time since, been put in use or practice, except as mentioned in

the response to the 7th interrogatory, and have never been used by defendants under said contract; he denies that said contract constitutes any estoppel; on his denying the validity of said patent, defendant would here state that he is not, and never has pretended to be, scientifically acquainted with the subject of electro-magnetism, or the machines and combinations constituting electro-magnetic telegraphs; and in making said contract, and in progressing under it, he relied upon the representations and assurances of complainants, and their agent, Amos Kendall, as to the validity of the patent.

To the 17th interrogatory he answers and says, that he wrote the letter to F. O. J. Smith which is copied in the bill of complaint.

To the 18th interrogatory he answers and says, that he has been informed, and believes, the release and transfer mentioned in said interrogatory were made as stated in the bill.

And having fully answered he prays to be hence dismissed, with his costs, &c.

HENRY O'RIELLY.

DISTRICT OF KENTUCKY, *sct.*

This day Henry O'Rielly made oath before me, the judge of the district court of the United States for the Kentucky district, that the matters stated in the foregoing answers, as made from his own knowledge are true, and as made from the information of others he believes them to be true.

Given under my hand on the 26th day of August, 1848.

THOS. B. MONROE.

Amended answer of O'Rielly.

The amended answer of Henry O'Rielly to his original answer to the bill of Samuel F. B. Morse and others, in the 8th circuit court of the United States, Kentucky district.

This respondent says in his answer, he finds he was mistaken as to the time when the complainants begun to make their line from Louisville to Nashville. He was not in Kentucky or Tennessee at the time of the commencement or completion of the line, and made his statement from information; they commenced putting up their wires he supposed about the time the line of defendant was completed, as they did not commence working until May. He refers to the affidavits of T. S. Bell, A. L. Peay, Duane Hall, and R. H. Woolfolk, which he files herewith for the true state of the matter.

HENRY O'RIELLY.

DISTRICT OF KENTUCKY, *sct.*

This day Henry O'Rielly [came] and made oath before me that the statements in the above answer are true as stated.

Given under my hand on the 28th day of August, 1848.

THOS. B. MONROE, J.

Order continuing injunction.

And afterwards, to wit, at the October term of said court, to wit, on the 17th day of October, 1848, came the complainants by their counsel, and on their motion the injunction granted herein by the district judge at his chambers, be and the same is hereby continued until the further order of this court.

Order filing answer of Hastings and Whitman.

And afterwards, to wit, at rules in the clerk's office, before the judge on the 24th day of October, 1848, came the defendants, Eugene L. Whitman and W. F. B. Hastings, by Henry Pirtle, esq., their counsel, and filed their answer herein.

Replication to answers.

Also came the complainants, by P. S. Loughborough, their counsel, and for replication to the answers of the defendants herein say, that the matters and things set forth and alleged in said answers are not true, and that the allegations of their bill are true, and thereupon they say that they ought not to be precluded from the relief sought in their said bill; wherefore, &c.

And defendants, by their counsel, moved for leave to take depositions before the American consul at London, in England; the American consul at Paris, in France; and at Munich, in Germany.

The following is the answer of E. L. Whitman and W. F. B. Hastings, to wit:

Answer of Whitman and Hastings.

The answer of Eugene L. Whitman and W. F. B. Hastings, to the bill of Samuel F. B. Morse and others, in the circuit court of the United States, for the Kentucky district. Your respondents say they were mere operators on said instrument, and had no other concern with it.

PIRTLE & JOHNSON.

Order—leave to take depositions in Europe.

And afterwards, to wit, at rules, before the judge, on the 28th day of October, 1848, it is ordered that commissions to take depositions in this cause be directed to the American consul at London, Great Britain, to the American consul at Paris, in France, and to any judge of a superior court in Munich, Bavaria.

Order—rule on O'Reilly, &c., to show cause, &c.

And afterwards, to wit, at the October term of the court aforesaid, to wit, on the 6th day of November, 1848, on motion of the complainants, by their counsel, on affidavit read and filed, it is ordered that

Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, show cause here on Thursday next, why an order shall not be made directing the marshal to take into his possession so much of the telegraph of defendants as shall be found in operation in violation of the injunction within the district of Kentucky, and keep the same in his custody, not allowing the same to be used for such purpose, until the said O'Rielly and Whitman shall have answered the allegations of contempt by them committed in violating the injunction on which the attachment herein was awarded.

Let a copy of this order be served on the defendants if found within the district, and if not, then upon their counsel in this cause.

And at a subsequent day of the October term aforesaid, to wit, on the 9th day of November, 1848, came the complainants, by their counsel, and the marshal having returned that he had served a copy of the rule entered up herein on the 6th inst., against the defendants, upon Henry Pirtle, the defendants' counsel, and that the defendants were not found, and no inhabitants; whereupon the complainants were heard upon their proof; but the court not being advised, took time, &c.

Order directing marshal to take telegraph line into possession.

And at a subsequent day of said October term, to wit, on the 13th day of November, 1848, came the complainants, by their counsel, and the court being now sufficiently advised of and concerning the matter of the rule herein heard upon a former day of the term, it is ordered that the marshal be, and he is hereby, directed to take into possession such parts of the line of wires and posts of the telegraph of the defendants within the district of Kentucky, as may be necessary for the purpose herein presently expressed, by breaking and intercepting the circuit of electricity through the wires, stop and prevent the defendants from further operations upon their telegraph within the district in any mode prohibited by the injunction herein; but in doing this, he will take such possession of no part of such wires, or posts, which shall not be necessary for him to have in his custody to effect and secure this object, but will leave the other parts thereof in the possession, or under the superintendence of the defendants, or their agents, as he may find them; and that he so hold the possession of such parts of the telegraph, and thereby prevent the violation of the injunction, until this cause shall be fully heard, or the further order of the court.

Order filing interrog's.

And afterwards, to wit, on the 4th day of December, 1848, came the defendants, by their attorneys, and filed interrogatories to witnesses in England; interrogatories to witnesses in Paris, France; interrogatories to witnesses in Munich, Bavaria; and interrogatories generally.

And afterwards, to wit, on the first day of January, 1849, came the complainants, by their counsel, and filed interrogatories herein.

And afterwards, to wit, on the 15th day of January, 1849, came the complainants, by their counsel, and filed cross interrogatories herein, upon the interrogatories filed by defendants.

Order extending time for taking depositions.

And afterwards, to wit, on the 22d day of January, 1849, came B. Monroe, esq., counsel for complainants, and filed an agreement between himself, as counsel, and H. Pirtle, esq.; and on his motion thereon, the time for taking depositions in this cause is extended until the first day of April next.

Orders filing additional interrogatories.

And afterwards, to wit, on the 1st day of March, in the year 1849, came the defendants, by their counsel, and filed additional interrogatories herein.

And afterwards, to wit, on the 3d day of March, 1849, came complainants, by their counsel, and filed interrogatories herein.

Order setting cause for trial.

And afterwards, to wit, at rules held in the clerk's office, before the clerk, on the 7th day of May, 1849, came complainants, by their counsel, and on his motion this cause is set down for hearing at the next May term.

Order remanding to rules.

And afterwards, to wit, at the May term of the court aforesaid, to wit, on the 7th day of June, 1849, came the parties aforesaid, by their counsel; and defendants' counsel moved the court to set aside the order in the clerk's office, setting down this cause for hearing, and the court being advised, do consider that said order, which was made in the clerk's office on the first Monday in May last, be and the same is hereby set aside, having [been] improperly made; and this cause is therefore remanded to the rules.

Order—motion to discharge order directing marshal to take possession of line.

And at a subsequent day of said May term, to wit, on the 12th day of June, 1849, the parties came, by their counsel, and the defendant, Henry O'Rielly, having appeared in answer to the charge of contempt committed by him and his co-defendants, in violating the injunction herein, and his affidavit made in open court having been read and filed, he, the defendant, O'Rielly, by his counsel, Messrs. Pirtle, Chase, &c., on his petition filed, moved the court to discharge the order made herein at the last term, directing the marshal to take into his possession a portion of the line of the wires of the telegraph of the defendants, and

break the circuit of electricity, and thereby stop and prevent the defendants from further operating upon their telegraph, in violation of the injunction herein; and that the marshal be directed to restore such possession so far as taken by him under said order. Whereupon—

The complainants, by their counsel, Loughborough, &c., having opposed the motion, their proofs were heard, and the matter and motion of the defendants was argued by counsel in part.

And at a subsequent day of said May term, to wit, on the 15th day of June, 1849, came again the parties by their counsel, and the matter of the charge of the contempt committed by the defendant, O'Rielly, in the violation of the injunction herein, and the motion of him, the defendant, O'Rielly, made on his petition on the 11th current, that the order made herein at the last term, in his petition mentioned, be discharged, having been fully argued by counsel, and the court advised thereof: It is ordered that the said order, made herein at the last term, whereby the marshal was directed to take into his possession a portion of the line of wires of the telegraph of the defendants for the purposes therein expressed, shall be discharged, and the marshal directed to restore the defendant, O'Rielly, whatever possession he has under said order, on the defendant, H. O'Rielly, executing his bond, with two or more sufficient securities, in the penal sum of $5,000, payable to the complainants; with condition that if he, the said O'Rielly, his co-defendants, or either of them, his or their servants, agents or transferees, or either of them, do by their operations upon said telegraph or line of wires, or any part thereof; or if he or his co-defendants, his or their servants or agents, shall in any otherwise commit, within the district of Kentucky, any violation or infringement of the exclusive rights of the complainants, held by them under the patents to Samuel F. B. Morse, in their bill exhibited, and the complainants succeed in the said suit, and obtain a final decree of injunction, and having an account of the damage suffered by them in consequence of the infringement of their said rights by the defendant and a decree therefor; then, if the said O'Rielly shall pay to the complainants the amount of such damages so adjudged, together with their costs, which he or the defendants may be ordered to pay the complainants, on such payment the obligation shall be void, otherwise to remain in force.

By the agreement of the parties, the sureties in the bond prepared by the clerk of this court may be judged of by F. S. J. Ronald, of Louisville, and by him returned to this court or the clerk's office. On the return thereof the court, or a judge thereof, will make the order absolute.

And afterwards, to wit, at rules in the clerk's office, before the judge, on the 13th day of June, 1849, came the parties, the complainants by P. S. Loughborough, esq., their counsel; and the defendants by H. Pirtle, esq., their counsel; and on their motion, and by agreement, the following agreements are entered, to wit:

Agreements.

It is agreed that the affidavits which were read upon the application

for an injunction in this case, by both parties of persons competent as witnesses, may be read as depositions upon the hearing.

P. S. LOUGHBOROUGH,
For complainants.
HENRY PIRTLE,
For defendants.

It is agreed, that the commissions for taking testimony in this cause by either party shall remain open till the first Monday in May next.

P. S. LOUGHBOROUGH,
For complainants.
PIRTLE,
For defendants.

And the commissions may remain open till the beginning of the next term.

P. S. LOUGHBOROUGH,
For complainants.
PIRTLE,
For defendants.

April 22d, 1849.

The parties to the foregoing suit waive all exceptions to the various depositions which have been taken and filed in this cause, except such objections as may arise from the incompetency of the witness, or the incompetency of the testimony contained in the depositions. It is further agreed, that either party may retake any deposition already taken, or examine any witness whose deposition has been taken by the opposite side; and that the commission for taking depositions shall be extended to the first Monday of October, 1849, without prejudice to the right of either party, at the October rules, to set this cause for hearing at the next October term of this court; and the parties hereby waive all exceptions to the regularity of setting said cause for hearing at said term. That the clerk may open the depositions as received, and all other publications, except such opening by the clerk is dispensed with. It shall be no objection to a deposition that it was received by the clerk after the first Monday in October next, and after the cause is set for hearing, if such deposition was taken before the said day.

M. C. JOHNSON,
For defendants.
P. S. LOUGHBOROUGH,
For complainants.

Order filing amended answer of O'Rielly.

And afterwards, to wit, at rules in the clerk's office, before the judge, on the 14th day of June, 1849, came the parties by their counsel; and on motion of the defendant, Henry O'Rielly, by his counsel, leave is given him to file an amended answer herein, which is done accordingly.

Replication to amended answer.

And the complainants for replication to said answer say, that the matters and things stated and set forth in said answer are not true in substance or in fact, and that the allegations in their said bill are true; and therefore they say they ought not to be precluded from the relief sought, &c.; wherefore, &c.

And it is consented by the defendants that the filing of the answer shall in nowise delay the cause or affect former agreements of the parties.

The following is the amended answer of H. O'Rielly, to wit:

Amended answer of H. O'Rielly.

SAMUEL F. B. MORSE and others, complainants,
against
HENRY O'RIELLY and others, defendants.

Eighth circuit court of U. S., K. D.

The amended answer of Henry O'Rielly to the bill of complaint filed against him and others in the eighth circuit court of the United States, for the Kentucky district, by Samuel F. B. Morse and others; the leave of the court therefor having been first asked and obtained.

This defendant, by way of further answer to the fourth special interrogatory in said bill of complaint, states, that the patent issued to said Samuel F. B. Morse, on the 20th June, 1840, reissued the 15th January, 1846, and again reissued on the 13th June, 1848, was illegally issued and reissued, and is absolutely void in all its parts and claims, for the following causes, in addition to those set forth in his original answer:

First. That on the application of said Samuel F. B. Morse letters patent were issued to him by the regular and proper authorities of the Government of France, securing to him as the inventor and discoverer the exclusive use and right, for a limited time, of the identical improvements and inventions described in the specifications and drawings annexed to, and constituting part of, the patent issued as aforesaid on the 20th June, 1840, and reissued as aforesaid; which letters patent issued on and bore date the day , 1838, prior to his filing his specifications and drawings as provided by law in the Patent office of the United States; all of which, though well known to said Morse, was not disclosed to the Commissioner of Patents in any of his applications for the issue and reissue of his said patent; whereby, through the mistake of said Commissioner and willful default of said Morse, said patent so issued and reissued granted to said Morse the exclusive use and right to said invention and improvements for the term of fourteen years from the 20th June, 1840, instead of fourteen years from the day of , 1838, the date and issue of said letters patent from the French Government; which latter term was the only period during which the exclusive use and right to said improvements and inventions could be granted ac-

cording to law; wherefore, as defendant is advised, said patent has been issued and reissued contrary to law, and is unauthorized and void.

Second. That said Samuel F. B. Morse was not the discoverer or inventor of electro-magnetism as a motive power for imprinting signals on paper or other suitable materials for telegraphic communication, as by him claimed in the first and eighth claims in the specifications annexed to the patent reissued on the 13th June, 1848; but as defendant is informed, believes, and charges, one Charles T. Jackson, of Boston, Massachusetts, made said discovery and invention; and in the year 1832, and prior to said Morse making any discovery or invention whatever, said Jackson communicated to said Morse a practical method or mode by which signals, signs of numerals and ideas, could be printed on paper by the motive power of electro-magnetism at any distance to which the electricity or galvanism could be carried by conductors forming electrical circuits.

Further answering he says, that he denies that Samuel F. B. Morse was the original inventor or discoverer of the use of a combination of dots and lines for expressing numerals or letters; for he charges, that in 1829, and prior to any invention or discovery by said Morse, one Dr. Swaime, of Philadelphia, published in a printed book a system of a mural diagraph, in which a combination of dots and lines is used for the purpose of expressing numerals or letters, whereby intelligent ideas could be communicated by sound, not articulate, and recorded as received or heard by said combination of dots, lines, and spaces, so as to form intelligible written language; which said printed book is referred to and made part of this answer. But defendant admits that said Morse did arrange and frame the identical combination of dots and lines composing his alphabet and signs of numerals; and if such arrangement be the subject of a patent, he believes that said Morse would only be entitled to the exclusive use of the identical combination made by him, that being the only thing by him invented. He does not, however, admit that such an arrangement of an alphabet is the subject of a patent.

JOHNSON.

Sworn to in open court by Henry O'Rielly, June 13th, 1849.

Attest: JNO. H. HANNA,
C. C. C. K. D.

Order to restore line to defendants.

And afterwards, to wit, on the 11th day of August, 1849, in the clerk's office, before Judge Monroe, the bond of the defendant, O'Rielly, with the surety required by the order herein of last term, (June 15,) having been executed and returned here, the marshal is directed to restore to the defendants whatever possession he took and holds of the line of wires of their telegraph, under the order at the October term, 1848, (Nov. 13th,) according to the said conditional order of the last term.

August 11th, 1849. MONROE.

The following is the bond, to wit:

Bond for restoration of line.

Know all men by these presents, that we, Henry O'Rielly, T. S. Bell, W. N. Haldeman, and H. Smith, are held and firmly bound unto Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, in the sum of five thousand dollars, to be paid to the said Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, their certain attorney, their heirs, executors, administrators, or assigns; to which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, firmly by these presents. Sealed with our seals, and dated this day of June, 1849.

The condition of this obligation is such, that whereas in the cause now depending in the eighth circuit court of the United States, Kentucky district, wherein Samuel F. B. Morse and his co-obligees are complainants, and the said Henry O'Rielly and others are defendants. It was after and on certain proceedings, which will there appear, ordered that the marshal be, and he is hereby directed, to take into his possession such parts of the line of wires and posts of the telegraph of the defendants within the district of Kentucky, as may be necessary for the purposes herein presently expressed, and by breaking and interrupting the current of electricity through the wires, stop and prevent the defendants from further operations upon their telegraph within the district in any mode prohibited by the injunction herein; but in doing this, he will take such possession of no part of such wires or posts which shall not be necessary for him to have in his custody to effect and secure this object, but will leave the other parts thereof in the possession, or under the superintendence, of the defendants, or their agents, as he may find them; and that he so hold the possession of such parts of the telegraph, and thereby prevent the violation of the injunction, until this cause shall be fully heard, or the further order of the court.

And the said Henry O'Rielly, at the present May term, 1849, of the said court, on his petition filed, moved the court to discharge the order made herein at the last term, directing the marshal to take into his possession a portion of the line of the wires of the telegraph of the defendants, and break the circuit of electricity, and thereby stop and prevent the defendants from further operating upon their telegraph, in violating the injunction herein; and that the marshal be directed to restore such possession so far as taken by him under said order; whereupon it was ordered, that the said order made herein at the last term, whereby the marshal was directed to take into his possession a portion of the line of the wires of the telegraph of the defendants for the purpose therein expressed, shall be discharged, and the marshal directed to restore the defendant, O'Reilly, whatever possession he has under said order, on the defendant, H. O'Rielly, executing his bond, with two or more sufficient sureties, in the penal sum of five thousand dollars, payable to the complainants, with condition that if he, said O'Rielly, his co-defendants, or either of them, his, or their servants,

agents, or transferees, or either of them, do, by their operations upon said telegraph or line of wires, or any part thereof; or if he or his co-defendants, his or their servants or agents, shall in any other wise commit, within the district of Kentucky, any violation or infringement of the exclusive rights of the complainants held by them under the patents to Samuel F. B. Morse, in their bill exhibited, and the complainants succeed in the said suit, and obtain a final decree of injunction, and having an account of the damage suffered by them in consequence of the infringement of their said rights by the defendant, and a decree therefor; then, if the said O'Rielly shall pay to the complainants the amount of such damages so adjudged, together with their costs, which he, the defendant, may be ordered to pay the complainants, on such payment the obligation shall be void, otherwise to remain in full force."

Now, the condition of this obligation is such, that if he, the said Henry O'Rielly, his co-defendants, or either of them, his or their servants, agents, or transferees, or either of them, do, by their operations upon said telegraph, or line of wires, or any part thereof; or if he or his co-defendants, his or their servants or agents, shall in any other wise commit within the district of Kentucky, any violation or infringement of the exclusive rights of the complainants, held by them under the patents to Samuel F. B. Morse, in their bill exhibited, and the complainants succeed in the said suit, and obtain a final decree of injunction, and having an account of the damage suffered by them in consequence of the infringement of their said rights by the defendant, and the decree therefor; then, if the said O'Rielly shall pay to the complainants the amount of such damages so adjudged, together with their costs, which he or the defendants may be ordered to pay the complainants, then, on such payment, this obligation is to be void, otherwise to remain in full force and virtue.

The said HENRY O'RIELLY, [SEAL.]
T. S. BELL, [SEAL.]
W. N. HALDEMAN, [SEAL.]
[SEAL.]
H. SMITH. [SEAL.]

Approved as sufficient sureties by, and signed, sealed, and delivered by the parties in presence of— FRANCIS S. J. RONALD.

Order setting cause for hearing.

And afterwards, to wit, at rules held in the clerk's office before the clerk, on the 1st day of October, 1849, came the complainants by P. S. Loughborough, their counsel, and on his motion this cause is set down for hearing.

Order—motion to continue overruled.

And afterwards, to wit, at the October term of the court aforesaid, to wit, on the 20th day of October, 1849, came the parties by their

counsel, and the defendants' counsel, Henry Pirtle, esq., upon the statement made by S. P. Chase, one of the counsel for defendants, and here filed, moved the court for a continuance of this cause, and the arguments being heard, and the court being advised, do consider that said motion be overruled.

Order—motion for trial by jury refused.

After the motion for a continuance was overruled, the counsel for the defendant, O'Rielly, moved the court to have the question of infringement of the patent of said Morse tried by a jury, but the court refused to refer the matter to a jury, and proceeded to the hearing.

Order heard in part.

Whereupon—

The cause came on to be heard upon the bill, answers, exhibits, depositions, and other proofs; but there not being sufficient time, the hearing is continued till Monday next.

And at a subsequent day of said October term, to wit, on the 22d of October, 1849, came the parties by their counsel, and the proofs of the complainants were heard in part; but there not being time to go through with the same, the further hearing is postponed until to-morrow.

And at a subsequent day of the said term, to wit, on the 23d of October, 1849, came again the parties by their counsel, and the proofs of the complainants were fully heard, and the proofs of the defendants heard in part; but there not being time to go through the same, the further hearing is postponed until to-morrow.

And afterwards, to wit, at a subsequent day of said October term, to wit, on the 24th day of October, 1849, came again the parties by their counsel, and the proofs of the defendants were fully heard.

List of papers read on the hearing.

The bill of the complainants and the answer of the defendant, O'Rielly, with his two amended answers, and the answer of Eugene L. Whitman and — Hastings, having been read, to which replication had been filed: The complainants read in proof the following documents in their bill, affidavits, depositions, and other documents exhibited.

The caveat patent of the 20th June, 1840; patent of the 15th January, 1846; patent of the 11th April, 1846; patent June 13th, 1848. 2d patent, same date; assignment, Gill to Morse; Morse, Smith, and Vail to Case; assignment, Case, Wright, &c., to Smith; assignment, Trustees of Cincinnati to Smith; assignment, Smith to Morse and Vail. Contract between Morse, &c., to O'Rielly, 13th June, 1845. Letter of O'Rielly and Smith; copies of correspondence between Commissioner of Patents and Morse, 3 parcels. Copy of Morse's application. French patent.

The parties had made and conformed to the following agreement:

June 13th, 1849.

It is agreed that the affidavits which were read upon the application for an injunction in this cause by both parties, by persons competent as witnesses, may be read as depositions upon the hearing.

Complainants read the following affidavits, Richard C. Morse, Leonard D. Gayle, Charles G. Page, James F. Foss, Thomas C. McAfee, N. C. Poor, Sarah Louisa Morse, Sidney E. Morse, Leonard D. Gayle, Philip S. Fall, T. P. Shaffner, George C. Davis, Charles Cargill.

Complainants read the following depositions, with the papers and drawings therein referred to, and made parts thereof.

Leonard D. Gayle, E. Goodrich Smith, Lewis H. Smeider, Andrew Prosch, James F. Foss, Sarah Louisa Morse, James C. Bliss, James Renwick, Robert Rankin, Francis Fisher, Philip S. Fall, Edmund Burke, Charles G. Page, Henry W. Paxton, John Stockhill, Charles T. Chester, Richard C. Morse, Edward N. Kent, James R. Chilton, William W. Pell, Matilda W. Dana, Thomas C. McAfee, George Wood, Benj. Pife, Jacob Walter, Wm. Constable, John Locke, Sidney E. Morse, Walter R. Johnson, John Torry, Sidney E. Morse, 2d deposition, Wm. H. Ellett, John F. Frazier.

The complainants offered in evidence the depositions of Prime and Andrews.

The counsel of the defendants objected to each of the depositions, on the ground that the matter of them was incompetent evidence in the cause for any purpose.

The court sustained the objections, and they were excluded. The depositions were, however, on the application of the complainants' counsel, retained in the record, and will be transcribed, so that the party may have the benefit of the question hereafter.

The defendants read [the] following affidavits: R. T. P. Allen, Charless B. Moss, Theodore S. Bell, R. H. Woolfolk, Robert Porter, E. F. Barnes, A. L. Peay, Charles P. Smith, Anslem Stager, Duane Hall.

The defendants read the following depositions, with the papers and drawings therein referred to, and made part thereof:

Robert Peter, Doctor Jackson, John H. Abbott, Cyrus Alger, Joseph Henry, P. D. Myers, Professor Renwick, E. F. Barnes, George W. Benedict, —— Gould, Francis Alger, Professor Silliman, John C. Cresson, —— Chilton, —— Zook, Nathan P. Chamberlane, Joseph Tracy, Horatio Bigelow, Charles T. Smith, C. T. Duran, Francis Fisher.

The complainants read, as repelling proofs on their behalf, the depositions of Cyrus Alger and Francis Alger, and of Doctor —— Jackson, which had been taken by the defendants prior to their taking of the depositions of said witnesses read as above stated on their behalf.

These depositions were not read as proof in chief of the facts the deponents state, but were offered only in opposition to the effect of the

testimony of the witnesses given afterwards in other depositions read by the defendants.

The complainants then offered and read in like manner in opposition to the effect of the testimony of Doct. Jackson, not as evidence in chief of the facts contained in the documents, the following letters and newspaper publications:

1st. Letter, dated New York, August 28th, 1837, from Samuel F. B. Morse to Doct. C. T. Jackson.

2d. Letter, dated New York city, September 18th, 1837, from Samuel F. B. Morse to Dr. Charles T. Jackson.

3d. Letter, dated New York City University, December 7th, 1837, from Samuel F. B. Morse to Doct. Charles F. Jackson.

4th. An editorial article in Boston Post, headed Electro-magnetic Telegraph.

The publication in the Boston Post signed Sam'l F. B. Morse.

The defendants objected to the reading of the last mentioned letter from S. F. B. Morse to Docter Jackson, dated the 7th day of December, 1837, and the last mentioned newspaper publication, signed S. F. B. Morse, and published in the Boston Post.

The parties had made an agreement, signed Smith and Chase, their counsel, in relation to the above documents, which was read and is on file as part of the record.

But the defendants objected to the two documents above mentioned, on the ground that they were not competent evidence for complainants.

And the matter was argued by counsel; but the court not being advised, took time until to-morrow.

And at a subsequent day of said October term, to wit, on the 25th of October, 1849, came again the parties by their counsel.

The court overruled the objection of the defendants made on yesterday to the documents offered by the complainants, and admitted the documents to be good for what they might be worth, under the head under which they were offered by the complainants.

The part of the article published in the New York Observer, which is the reply of Sidney E. Morse to the article published by Doct. Jackson in the Boston Post, was excluded.

Motion for complainants to produce instrument, &c., overruled.

The defendants moved the court that an order be made on the complainants that they produce in court the telegraph instrument now used by them on their line between Louisville and Nashville. The complainants objected that it was unnecessary.

The defendants did not produce the Columbian telegraph, or other instrument used by them.

The court overruled the motion.

Motion of defendants to exclude portions of depositions, &c., overruled.

The defendant, O'Rielly, moved the court to suppress and exclude

the answers severally given in the several depositions offered by the complainants to witnesses of the complainants, numbered 3, 30, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, last clause 47, 48, 52, 54, 56, 58, 59, the same being objected to as leading questions.

The parties had agreed, when the cause was opened, that any objections might be made by either party to any document or deposition, or part thereof, on the ground of the incompetency of the witness or of the matter contained in the deposition or document when the paper was offered.

After the complainants' deposition had been read, the counsel of the defendants stated that he would have no objection to portions of the depositions on the ground that they were answers to leading interrogatories of complainants, and it was thereupon understood that such objection might be presented thereafter, and avail, if it could, at the time when mentioned, be properly urged and avail.

The court overruled defendants' motion.

Motion by defendants to refer to jury, &c., refused.

After the depositions and other papers in the cause had been read, the defendant, O'Rielly, again asked the court to have the questions of originality of the invention of said Morse, and that of the infringement of his patent, tried by a jury; but the court refused to refer either matter to a jury.

Agreement—certain papers to be taken to Supreme Court without being copied in complete record.

It is agreed that should this cause be taken to the Supreme Court, the books and pamphlets and lectures of Professor Dana, referred to in the depositions may be read before that court as if copied in this record, and no record thereof need be made or transcribed. The magnet and the types referred to may also be sent up to that court, with all the drawings filed in the cause, nor need the same be enrolled upon the complete record book.

The above was the case, and thereupon the argument of counsel was heard in part; but there not being time, &c., the further argument is postponed until to-morrow.

And at a subsequent day of said October term, to wit, on the 26th of October, 1849, came again the parties by their counsel, and this cause was further heard and argument postponed until to-morrow, there not being time to go through the same.

And at a subsequent day of said October term, to wit, on the 27th October, 1849, came again the parties, by their counsel, and the arguments being fully heard, but the court not being sufficiently advised, took time, &c.

And at a subsequent day of said October term of said court, to wit, on the 29th of October, 1849, came the parties, by their counsel; and it is agreed that an appeal to the Supreme Court may be prosecuted by

the defendants to the decree perpetuating the injunction without waiting for the termination of any further proceedings upon executing the requisite appeal bond.

Decree.

And at a subsequent day of the October term of said court, to wit, on the 12th day of November, 1849, this cause was heard at this term, and argued by counsel. Whereupon, on consideration thereof,

It is found and adjudged by the court that the letters patent of the United States to the complainant, Samuel F. B. Morse, for his invention of a new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism, originally issued June 20th, 1840, but reissued on the 15th day of January, 1846, and aftewards finally reissued on the 13th of June, 1848, in their bill exhibited and read on the hearing of this cause, are valid and effectual acts of the Government; and that the complainants are thereby, and by the assignments by them in their bill alleged, vested with the exclusive rights thereby granted. And

It is found and adjudged by the court, that the defendants have, in those rights, disturbed the complainants as in their bill alleged; that they, the defendants, after the grant thereof to the patentee, Samuel F. B. Morse and his assignments to his co-complainants, and after the final reissue of the letters patent above mentioned, did, within the district of Kentucky and elsewhere, wrongfully construct, and unlawfully employ, a telegraph, consisting of combined circuits of electricity, worked by the motive power of electro-magnetism, substantially the same plan of construction and principle of operation with the telegraph of the said Morse in his letters patent described and specified; and by which intelligence, which was in one station, was, by the defendants, transmitted to other distant stations, by making thereat a permanent record thereof in the alphabetical characters described and specified in the letters patent to the said Morse, and did thereby violate and infringe the exclusive rights so granted by the United States to him, the said Samuel F. B. Morse, and invested in the complainants as above found; and it is considered that the injunction heretofore granted herein was rightfully awarded and enforced.

It appears, however, by the document itself, read by the complainants among their proof, that the patentee, Samuel F. B. Morse, had, on the 30th day of October, 1838, prior to the issuing of his original patent, awarded by the United States for his original invention, obtained of the Government of France a patent for the invention of his electro-magnetic telegraph, in principle and plan of construction the same with that described in his said letters patent so afterwards obtained of the United States. And

It seems to the court that the exclusive right of the complainant, in respect to his original invention, is limited by this foreign patent to the term of fourteen years from its date.

It is therefore ordered, adjudged, and decreed, that the defendants, their servants and agents, be, and they are hereby, enjoined and commanded that they, and each of them, do still desist, and shall for and during the term of fourteen years from the 30th day of October, 1838, altogether refrain, from all and every use of the electro-magnetic telegraph, which the complainants in their bill charged was, by the defendants, employed in violation of their rights, which, in its several forms is described in the proofs of the cause, and denominated by the witness in the depositions, and by defendant, O'Rielly, in his answer, the Columbian telegraph, in the transmission of intelligence which is in one place to another distant place, by making thereat a permanent record in the alphabetical characters in the patent of Samuel F. B. Morse for his original invention specified; or by making thereat, with the action of the instrument which would make such characters, alphabetical sounds, and out of them composing such characters or words in the ordinary alphabet; and from the using of such telegraph, or any part thereof, in any other mode, in violation of the exclusive rights so granted by the United States and vested in the complainants; and that they shall, for and during the said term of fourteen years, refrain from making, constructing, or vending, to be used within the district of Kentucky, any other telegraph consisting of combined circuits of electricity, worked by the motive power of electro-magnetism, on the plan and principle of the electro-magnetic telegraph of the complainant, Morse, described and specified in his letters patent, by which intelligence shall or may be transmitted by making, in the mode above stated, a record thereof in the said alphabetical characters of the said Samuel F. B. Morse, or in an alphabet formed on the same plan and principle, or by making in such mode sounds, whereof such characters shall or may be composed, in the violation and infringement of the exclusive right of the complainants as they are above adjudged.

It is also found and adjudged by the court, that the letters patent of the United States to Samuel F. B. Morse, for his invention of "a new and useful improvement in electro-magnetic telegraph," originally issued on the 11th day of April, 1846, but afterwards reissued on the 13th of June, 1848, with the amended specifications of the improvements invented, which is in the bill of the complainants exhibited, and made part of the record of this cause, is a valid and effectual act of the Government; and that the complainants are thereby, and by the assignments in their bill alleged, vested with the exclusive rights thereby granted. And

It is found and adjudged, that the defendants have disturbed the complainants in these their exclusive rights. It is found that the defendants, before and after the issuing of the said last mentioned letters patent of the 13th June, 1848, in renewal of the said former patent, did, within the district of Kentucky and elsewhere, wrongfully cause to be constructed, and did unlawfully use and employ as a part of the electro-magnetic telegraph, denominated the Columbian telegraph, an instrument denominated by them the mutator, in plan of construc-

tion, principle of operation, and in the purpose accomplished by it, substantially the same with the improvement described and specified in the said last mentioned letters patent to the complainant, Morse, which consists of the contrivance called, in his schedule to his patent, the receiving magnet, and which is by this denomination described and specified *and specified* under the head of the first claim of the improvements in his schedule. And

That they did, in like manner, cause to be constructed, and unlawfully employ, as another part of the said Columbian telegraph, certain other apparatus and instruments and combinations thereof, in plan of construction, principle of operation, and purpose, substantially the same with the improvements of the register invented by him, the said Samuel F. B. Morse, and in the schedule described and specified as the third thing claimed by him as his invention, consisting of the combination of the point of the pen and pen lever, with the grooved roller over which the paper is passed, and receives the indentations of his alphabetical characters, and whereby is dispensed with the use of the coloring material, as specified in the patent for the original invention of the telegraph, first above mentioned, issued and bearing date January 15th, 1846. And

It is found that the said telegraph, called the Columbian telegraph, containing and consisting in part of the said two improvements of the said Morse, described and specified in his said last mentioned letters patent, was by the defendants employed, before and after the last issue of the said last mentioned letters patent, within the district of Kentucky and elsewhere, in the transmission of intelligenee in the mode above mentioned, in violation and infringement of the exclusive right so granted by the United States by these last mentioned letters patent, and held by the complainants as by them alleged and by the court adjudged.

It is therefore ordered, and adjudged, and decreed, that the defendants, their servants and agents, be and they are hereby enjoined and commanded that they and each of them do still desist, and shall forever, and during the term of fourteen years from the eleventh day of April, eighteen hundred and forty-six, altogether refrain from all and every use and employment of the above mentioned telegraphic instruments, denominated the mutator, in the combination with the other above described instruments of such telegraph, or in any other combination on the same plan and principle, in the transmission of intelligence in the district of Kentucky. And

That they do still desist, and for and during the said term of fourteen years, refrain from all and every such employment in the transmission of intelligence within the district of Kentucky, of the above mentioned improvement of the complainant, Morse, in the register of his telegraph, whereby is accomplished the making of his alphabetical characters before mentioned, described, and specified by indentation instead of by coloring matter, in violation of the exclusive rights of complain-

ants, by them held under the aforesaid letters patent as above adjudged. And

That the defendants shall, for and during the said term of fourteen years from the said eleventh day of April, eighteen hundred and forty-six, refrain from constructing or vending to be employed in such transmission of intelligence, within the district of Kentucky, any of the above mentioned improvements, either the instrument denominated the mutator, the improved register of said Morse, or any other of the improvements in the electro-magnetic telegraph, so described and specified in said letters patent as the invention of the said Samuel F. B. Morse, and whereof the exclusive right is granted him; and that they shall in no otherwise, for the term aforesaid, violate or in anywise infringe the aforesaid exclusive rights of the complainants within said district of Kentucky. And

It is ordered, that the complainants may have the proper writs of execution on what is above decreed.

It is further considered by the court, that the complainants will be entitled to recover of the defendants the damages by them, the complainants, sustained in consequence of the infringements and violations of their exclusive rights, which it is above adjudged had been committed by the defendants, together with their costs in the prosecution of this suit expended.

But the consideration of the matter of these damages, of the mode in which the same shall be ascertained and assessed, and whether the defendants, all of them, in solido, shall be adjudged to pay the whole amount thereof, or the defendant O'Rielly only shall be adjudged to pay the whole amount thereof, or how otherwise the judgment in respect to the damages shall be rendered, together with the matter of the costs, and the decree to be rendered therefor, is reserved by the court until the next term.

But to facilitate the decision and expedite the termination of the cause, it is ordered, that the proofs in respect to the damages so suffered by the complainants, and an account thereof, may be taken in the mean time, before and under the direction of the master commissioner:

The master shall proceed, on the application of either party, on proper notice to the other, and himself hear and take the testimony of any witnesses produced by the party, or according to the circumstances direct the testimony of any witness to be taken under a commission, and interrogatories to be settled before himself; and the proof being taken, the master shall state an account, showing the total amount of the receipts of the defendants for the operation of their telegraph within the district of Kentucky, whilst the telegraph of the complainants was in operation on the same lines and at the same stations, with an estimate of what the transmission of such intelligence on the line of the complainants would have cost them, in addition to the expenses of their line actually paid by them without having such intelligence to transmit, if anything; and shall make such estimates and such other

accounts as may be required of either party, or he shall judge necessary, in order to show the amount of damages, and by whom to be paid, whatever may be the principle finally adopted for the settlement thereof. And these estimates and accounts, together with the depositions of the witnesses and other proofs, the master shall report to the court.

William S. Pilcher is appointed the master commissioner in the case.

Order granting appeal.

Whereupon the defendants, by Victor Monroe, their counsel, prayed an appeal to the Supreme Court of the United States from the foregoing final decree of injunction, which is granted upon the defendants entering into bond, with good and sufficient security, within ten days, in the penal sum of three thousand dollars, conditioned according to law.

Order extending time to execute appeal bond.

And at a subsequent day of said October term of said court, to wit, on the 24th day of November, 1849, (on the prayer of the defendants and the order of the court granting them the appeal:)

The defendants, by their counsel, showed why they had failed to have executed and filed the bond in the time required by the order granting them the appeal, and moved the court that further time be allowed them. Whereupon,

It is ordered, that on a bond prepared by the clerk of this court, in the penalty, with the condition, and in the form before prescribed and executed by T. S. Bell, W. N. Haldeman, and Hamilton Smith, or by Hamilton Smith only as security, before the commissioner of this court, in the city of Louisville, and filed in the clerk's office, within twenty days from this day, the appeal shall be deemed allowed as originally granted, and shall be certified accordingly.

The following is the appeal bond, executed herein:

Appeal bond.

Know all men by these presents, that we, Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, and Theodore S. Bell, Walter L. Haldeman, and Hamilton Smith, are held, and firmly bound, unto Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, in the sum of three thousand dollars; to which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents. Sealed with our seals, and dated this 29th day of November, 1849.

The condition of the above obligation is such, that whereas, lately, in the eighth circuit court of the United States, in and for the district of Kentucky, at the October term, 1849, in a case wherein the said Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, were complainants, and Henry O'Rielly, Eugene Whitman, and W. F. B. Hastings, were defendants, there was rendered a decree of final injunction against the defendants, enjoining them against the infringement and violation of the exclusive right of the complainants, held by them

under certain patents of the United States of America to the complainant, Samuel F. B. Morse, as by the court in said cause adjudged, which will more fully and at large appear by the decree hereby referred to for the greater certainty, from which decree an appeal was prayed and allowed to the Supreme Court of the United States.

Now, if the said Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, shall prosecute said appeal with effect, and obtain the reversal of said decree; or in case said appeal shall be dismissed, or the decree affirmed, that then the said Henry O'Reilly, Eugene L. Whitman, and W. F. B. Hastings shall pay all the costs and damages which shall be awarded against them, or either of them, and shall fully perform and abide said decree as the said Supreme Court may render, or order to be rendered, in the premises, then the above obligation to be void, otherwise to remain in full force and virtue.

HENRY O'RIELLY, [L. S.]
[L. S.]
W. N. HALDEMAN, [L. S.]
T. S. BELL, [L. S.]
HAMILTON SMITH. [L. S.]
[L. S.]

UNITED STATES OF AMERICA,
8th circuit, Kentucky, ss:

I, William S. Pilcher, commissioner of affidavits, &c., in and for the said circuit and district, residing in the city of Louisville, certify that W. *H.* Haldeman, T. S. Bell, and Hamilton Smith, residents of Jefferson county, and to me well known, appeared before me, and severally acknowledged that they had signed, sealed, and delivered the foregoing instrument of writing to be their act and deed, for the purposes and uses it expresses; and I further certify, that the three persons aforesaid, in my opinion, are good and sufficient surety, and able to pay the penalty of the foregoing bond; aud I further certify, that each of them make oath to the matter hereof.

In witness whereof I have hereto set my hand and seal, this 29th day of November, 1849.

W. S. PILCHER, *Com'r.* [L. S.]

Caveat.

The caveat is as follows, to wit:

The United States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify, that the annexed is a true copy of the caveat filed by Sam'l F. B. Morse, on the 6th October, 1837, omitting the drawing, which has been mislaid.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this twelfth day of July, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-second. [L. S.]

EDMUND BURKE.

To the Commissioner of Patents, the Hon. Henry L. Ellsworth, the petition of Samuel F. B. Morse, of New York, in the county and State of New York, respectfully represents:

That your petitioner has invented a new method of transmitting and recording intelligence by means of electro-magnetism, which he denominates the American Electro-Magnetic Telegraph, and which he verily believes has not been known or used prior to the invention thereof by your petitioner. Your petitioner further states, that the machinery for a full practical display of his new invention is not yet completed, and he therefore prays protection of his right till he shall have matured the machinery, and desires that a caveat for that purpose may be filed in the confidential archives of the Patent office, and preserved in secrecy, according to the terms and conditions expressed in the act of Congress in that case made and provided, he having paid twenty dollars into the treasury, and complied with other provisions of the said act.

SAMUEL F. B. MORSE.

New York, Sept'r 28th, 1837.

Specification of the American Electro-Magnetic Telegraph.

To all whom it may concern.

Be it known that I, Samuel F. B. Morse, of the city of New York, in the county and State of New York, have invented a new method of transmitting and recording intelligence by means of electro-magnetism, which I call the American Electro-Magnetic Telegraph, and I do hereby declare that the following is a full and exact description of said telegraph, so far as it [is] at present completed.

The nature of my invention consists in laying an electric or galvanic circuit or conductors, of any length, to any distance. These conductors may be made of any metal, such as copper or iron w[ire,] or strips of copper or iron, or of cord or twine, or other substance, gilt, silvered, or covered with any metal leaf properly insulated in the ground, or through or beneath the water, or through the air, and by causing the electric or galvanic current to pass through the circuit by means of any generator of electricity, to make use of the visible signs of the presence of electricity in any part of the said circuit, to communicate any intelligence from one place to another.

To make the said visible signs of electricity available for the purpose aforesaid, I have invented the following apparatus, namely:

First. A system of signs by which numbers, and consequently words and sentences, are signified.

Second. A set of type, adapted to regulate and communicate the signs, with cases for convenient keeping of the type, and rules in which to set up the type.

Third. An apparatus called a port rule, for regulating the movement of the type rules; which rules, by means of the type, in their turn, regulate the times and intervals of the passage of electricity.

Fourth. A register, which records the signs permanently.

Fifth. A dictionary or vocabulary of words, numbered and adapted to this system of telegraphs.

Sixth. Modes of laying the conductors, to preserve them from injury.

First.—*The system of signs.*

The signs are the representatives first of numerals, and are as follows: The single numerals are represented by ten marks, such as dots, lines, or punctures, varied thus: A single mark signifies the numeral one; two marks, two; three marks, three; four marks, four; five marks, five; six marks, six; seven marks, seven; eight marks, eight; nine marks, nine; and ten marks, ten or cypher. The cypher is also signified by a single mark, differently placed from the rest. The numerals are separated from each other by short intervals, so that they would be represented in the different ways shown in example 1st of the annexed drawing. The compound numbers are separated from each other by long intervals; for example, the compound number 324, compounded of 3 and 2 and 4, and the compound number 516, compounded of 5 and 1 and 6, would be represented as shown in figure 1st, example 2d.

The signs for cypher (mark), or(——), placed before a number, signifies that that number is to be read as a number, and not as the representative of a word, thus, "send 56 copies" would be thus represented. Suppose the word "send" to be represented by the number 21, and the word "copies" by 34, then the sentence would be written as in figure 2d, example 2d; thus all numbers, and consequently all words, are easily represented.

Second.—*The type.*

A set of type, made of thin metal, such as type metal, brass, iron, or other material, consists of twelve different pieces, of the figure and dimensions represented in example 3 of the annexed drawing.

The rest is for the lever (hereinafter described) to rest upon previous to beginning to communicate. Each type has a notch or indentation, corresponding to its denomination, and the short space in addition; the number of each type is marked upon the part occupied for the space or interval; the cypher is either marked by the type with 10 notches, or with the type of a single tooth between two sunken spaces. Two additional pieces, making fourteen in all, are, first, the space, or long interval placed between separate and compound numbers, and consisting of more than double the length of the short space; and, second, the stop or long type which throws up the lever upon a detent until wanted again.

The cases are of wood, or other suitable material, with small compartments of the exact length of each type, for the greater convenience in distributing them.

The rules are of wood, metal, or other suitable material, and are formed about three feet long, and with a groove in which to place the

type, as represented in example 4. The rule is furnished with cogs for the purpose of being moved by a pinion wheel.

Third—*The port rule.*

The port rule is for the purpose of carrying the rule when prepared with its type; it consists:

1st. Of a small lever somewhat like the levers to the keys of a hand organ, but with the power between the fulcrum and the weight; the lever is made to rise or fall by passing the rule with its type beneath the projection or single cog in the lever, which cog falls into each notch and rises on each tooth of the type; the lever is made a portion of the circuit by affixing a small portion of the conductor to it, with a joint at the hinge end of the lever moving in mercury, or otherwise connected, so that the circuit be not interrupted; the other end of the small portion of the circuit is at the end of the lever which has the most motion, and by the rise and fall of the lever is made to break and close the circuit at the desired times; the moveable point of *of* the conductor closes the circuit either by a touch either into mercury, which holds the other extremity of the circuit, or upon a plate of copper, silver, or other metal attached to the said extremity.

2d. The rule is made to pass with regularity as to space and time beneath the lever, by means of a pinion wheel fitting into the cogs of the rule, which wheel is made to revolve either by a crank moved by the hand, or by other power in any of the well known and common mechanical methods.

3d. The rule is kept in its course by a channel or ways made for that purpose; the port rule sends the intelligence.

Fourth—*The register.*

The register at any distance from the port rule receives and records the intelligence, and is thus constructed:

1st. An electro-magnet made in any of the usual modes of forming it, such as winding insulated copper wire, or strips of copper, or tin foil, or other metal around a bar of soft iron, either straight or bent into a circular form; has the two extremities of the coils connected with the circuit or conductors so that the coils around the magnet make part of the circuit; the power of this magnet is applied:

2d. To a lever or pendulum, by affixing to the said lever or pendulum the armature of the magnet or short bar of iron at such distance that the electro-magnet will readily attract it. A small weight or spring keeps the lever and armature from the magnet when the magnet is not in action.

To the lever or pendulum is attached:

3d. A pencil or fountain pen, or a small printing wheel, or any other marking material; this pencil or other marking material is made to mark upon—

4th. A light cylinder, of a size to hold a convenient sheet of paper

which is wrapped around it; the cylinder is made to revolve as to time and place slowly and regularly upon its arbor or shaft by means of clock machinery, and to advance a short distance upon the shaft every revolution by means of a screw and cog apparatus, so that a line formed by a stationary point above the cylinder describes upon it a spiral or screw line; the point of the pencil or other marking material is kept in contact with the surface of the paper upon the cylinder, either by its own weight or by a small weight attached to it; or when the printing wheel is used, the wheel is brought into contact with the paper by the magnet when required to mark.

5th. A bascule, or method of changing the poles of the magnet after every stroke of the lever is affixed to the magnet and regulated by the movement of the lever.

6th. An alarum apparatus to give notice that a communication is about to be made is also affixed, and is made to strike or give notice at the first movement of the lever.

To each register are attached duplicate cylinders for the convenience of continued writing, so that when one cylinder is filled the other cylinder by a shifting apparatus begins to receive the marks; the paper when ready to be removed from the cylinder forms a regular page prepared for binding in a volume.

Fifth—*The dictionary or vocabulary.*

The dictionary is a complete vocabulary of words alphabetically arranged and regularly numbered, beginning with the letters of the alphabet, so that each word in the language has its telegraphic number. The modes which I propose of laying the circuit and of insulating the wires and conductors are various; the wires may be insulated by winding each wire with silk, cotton, flax, or hemp, and then dipping them into a solution of caoutchouc, or into a solution of shellac, or into pitch or resin and caoutchouc; they may be laid through the air; enclosed above the ground; in the ground; or in the water. When through the air, they may be insulated by a covering that shall protect them from the weather, such as cotton, flax, or hemp, and dipped into any solution which is a non-conductor, and elevated upon pillars; when enclosed above the ground they may be laid in tubes of iron or lead, and these again may be enclosed in wood, if desirable; when laid in the ground they may be enclosed in iron, leaden, wooden, or earthern tubes, and buried beneath the surface. Across rivers the circuit may be carried beneath the bridges, or where there are no bridges, enclosed in lead or iron, and sunk at the bottom, or stretched across where the banks are high upon pillars elevated on each side of the river.

What I claim as my invention, and desire to secure by letters patent, and to protect for one year by a caveat, is a method of recording permanently electrical signs, which, by means of metallic wires, or other good conductors of electricity, convey intelligence between two or more places.

In testimony whereof I, the said Samuel F. B. Morse, hereto subscribe my name in the presence of the witnesses whose names are hereto subscribed, on the third day of October, A. D. 1837.

SAM. F. B. MORSE.

Signed in our presence—
ALEX. J. DAVIS,
E. O. MARTIN.

STATE OF NEW YORK,
County of New York, ss.

On the third day of October, A. D. 1837, before the subscriber, a commissioner of deeds in and for said county, and authorized by law to administer oaths, personally appeared Samuel F. B. Morse, and made oath that he verily believes that he is the first and original inventor of the electro magnetic-telegraph, within mentioned and described in the specification by him subscribed, and that he does not know or believe that the same was ever before known or used, and that he is a citizen of the United States.

ISAAC O. BARKER,
Commissioner of deeds in and for the city and county of New York.

The patent of the 20th of June, 1840, from the United States to S. F. B. Morse, is as follows, to wit:

Patent of the 20th June, 1840.

The United States Patent office.

To all persons to whom these presents shall come, greeting: This is to certify, that the annexed is a true copy of Samuel F. B. Morse's letters patent, with specification and drawings correctly attached.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affix-
[L. S.] ed, this tenth day of August, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-third.

EDMUND BURKE.

No. 1647.

The United States of America, to all to whom these letters patent shall come:

Whereas Samuel F. B. Morse, New York, has alleged that he has invented a new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not to the best of his knowledge and belief, been previously known or used; has paid into the treasury

of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are, therefore, to grant according to law, to the said Samuel F. B. Morse, his heirs, administrators or assigns, for the term of fourteen years from the twentieth day of June, one thousand eight hundred and forty, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Samuel F. B. Morse, in the schedule hereto annexed, and is made a part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent office has been hereunto affixed.

[L. S.

Given under my hand at the city of Washington, this twentieth day of June, in the year of Lord one thousand eight hundred and forty, and of the independence of the United States of America the sixty-fourth.

Countersigned and sealed with the seal of the Patent office.

JOHN FORSYTH,
Secretary of State.
H. L. ELLSWORTH,
Commissioner of Patents.

Schedule.

The schedule referred to in these letters patent, and making part of the same.

To all persons whom it may concern.

Be it known that I, the undersigned, Samuel F. B. Morse, of the city, county, and State of New York, have invented a new and useful machine and system of signs for transmitting intelligence between distant points by the means of a new application and effect of electro-magnetism, in producing sounds and signs, or either, and also for recording permanently by the same means, and application, and effect of electro-magnetism any signs thus produced and representing intelligence, transmitted as before named between distant points A, and I denominated the said invention the American Electro-Magnetic Telegraph, of which the following is a full and exact description to wit. It consists of the following parts.

First. Of a circuit of electric or galvanic conductors, from any generator of electricity or galvanism, and of electro magnets at any one or more points in said circuit.

Second. A system of signs, by which numerals, and words represented by numerals, and thereby sentences of words as well as numerals, and letters of any extent and combination of each, are communicated to any one or more points in the before described circuit.

Third. A set of type, adapted to regulate the communication of the

above mentioned signs. Also, cases for convenient keeping of the type, and rules in which to set and use the type.

Fourth. An apparatus called the straight port rule, and another called the circular port rule, each of which regulates the movement of the type when in use, and also that of the signal lever.

Fifth. A signal lever, which breaks and connects the circuit of conductors.

Sixth. A register, which records permanently the signs communicated at any desired points in the circuit.

Seventh. A dictionary or vocabulary of words, to which are prefixed numerals for the uses herein after described.

Eighth. Modes of laying the circuit of conductors.

The circuit of conductors may be made of any metal, such as copper or iron wire, or strips of copper or iron, or of cord or twine, or other substances gilt, silvered, or covered with any thin metal leaf properly insulated and in the ground, or through or beneath the water, or through the air. By causing an electric or galvanic current to pass through the circuit of conductors laid as aforesaid by means of any generator of electricity or galvanism, to one or more electro-magnets placed at any point or points in said circuit, the magnetic power thus concentrated in such magnet or magnets is used for the purposes of producing sounds and visible signs, and for permanently recording the latter at any and each of said points, at the pleasure of the operator, and in the manner hereinafter described, that is to say, by using the system of signs which is formed of the following parts and variations, viz :

Signs of numerals consist 1st, of ten dots or punctures, made in measured distances of equal extent from each other, upon paper or any substitute for paper, and in number corresponding with the numeral desired to be represented; thus, one dot or puncture for the numeral 1; two dots or punctures for the numeral 2; three of the same for 3; four for 4; five for 5; six for 6; seven for 7; eight for 8; nine for 9; and ten for 0; as particularly represented on the annexed drawing, marked example 1, mode 1, in which is also included a second character to represent a cypher, if preferred.

Signs of numerals consist, 2dly, of marks made as in the case of dots, and particularly represented on the annexed drawing, marked example 1, mode 2.

Signs of numerals consist, 3dly, of characters drawn at measured distances in the shape of the teeth of a common saw by the use of a pencil or any instrument for marking. The points corresponding to the teeth of a saw are in number to correspond with the number desired to be represented, as in the case of dots or marks in the other modes described, and as particularly represented in the annexed drawing, marked example 1, mode 3.

Signs of numerals consist, 4th, of dots and lines separately and conjunctively used as follows: the numerals 1, 2, 3, and 4 being represented by dots as in mode 1, first given above. The numeral 5 is

represented by a line equal in length to the space between the two dots of any other numeral; 6 is represented by the addition of a dot to the line representing 5; 7 is represented by the addition of two dots to said line; 8 is represented by prefixing a dot to said line; 9 is represented by two dots prefixed to said line; and cypher is represented by two lines, each of the length of said line that represents the number 5; said signs are particularly set forth in the annexed drawing, marked example 1, mode 4. Either of said modes are to be used as may be preferred or desired, and in the method hereinafter described.

The sign of a distinct numeral, or of a compound numeral, when used in a sentence of words or of numerals, consists of a distance or space of separation between the characters of greater extent than the distance used in separating the characters that compose any such distinct or compound numeral. An illustration of this sign is particularly exhibited in the annexed drawing, marked example 2.

Signs of letters consist in variations of the dots, marks, and dots and lines, and spaces of separation of the same formation as compose the signs of numerals, varied and combined differently to represent the letters of the alphabet in the manner particularly illustrated and represented in the annexed drawing, marked example 3.

The sign of a distinct letter or of distinct words, when used in a sentence, is the same as that used in regard to numerals, and described above.

Signs of words and even of set phrases or sentences may be adopted for use and communication in like manner under various forms as convenience may suggest.

The type for producing the signs of numerals, consist, 1st, of fourteen pieces or plates of thin metal, such as type metal, brass, iron, or like substances, with teeth or indentations upon one side or edge of ten of said type, corresponding in number to the dots or punctures or marks requisite to constitute the numerals respectively heretofore described in the system of signs, and having also a space left upon the side or edge of each type at one end thereof, without teeth or indentations, corresponding in length with the distance or separation desired between each sign of a numeral.

Another of said type has two indentations forming thereby three teeth only, and without any space at either end, to correspond with the size of the cypher as heretofore described by reference to example 1, modes 1, 2, 3, of drawings in said system of signs; one other of said type is without any indentation on its side or edge, and being in length to correspond with the distance or separation desired between distinct and compound numerals, and with the sign heretofore described for that purpose. One of the remaining two of said type is formed with one corner of it beveled, system of type, exam. 4, fig. 1, and is called a rest, and the other is in a pointed form, and called a stop. Each of said type is particularly delineated on the annexed drawing, marked example 4, figure 1, and numbered and labeled in accordance with the purpose for which they are designed respectively; and are used in

like manner for producing each of the several signs of numerals heretofore described in the system of signs.

The type for producing the signs of numerals consist, 2dly, of five pieces or plates of metal, first described above, four of which are the same as are numbered 1, 2, 3, and 4, in the annexed drawing marked example 4, figure 1, and the fifth one being the same as is denominated, in the same example, "the long space," and heretofore alluded to; also of six other pieces or plates of said metal, varied in indentations, and teeth, and spaces, as represented on the annexed drawing, marked example 4, figure 2, to produce signs of the denominations described in the 4th mode of the before mentioned system of signs, example 1.

The type for producing the signs of letters are of the same denomination with those used in producing signs of numerals, and only varied in form, from one to twenty-three, as exhibited in the annexed drawing, marked example 5.

The type for producing both signs of numerals and signs of letters are adapted for use to either a straight rule, called the straight port rule, and are in that case made straight lengthwise, as described in the drawings annexed, and heretofore referred to in example 5; or to a circular port rule, in which case they are lengthwise circular, or formed into sections of a circle, as represented in the drawings annexed, marked example 6, figures 2 and 3, and as will be further understood by the descriptions hereinafter contained of the straight and circular port rules. On the under side of the type for the circular port rule, which type are of greater thickness than those of the straight port rule, is a groove system of type, ex. 6, A, in figs. 1 and 3, about midway of their width, and in depth about *have* the thickness aforesaid, and extending from the space ends, as B, example 6, fig. 3, (that is, the ends without indentations,) of said type, along the length, and conforming to the curve thereof, to a point, D D, equal in distance from the opposite ends, to half the width of the pointed teeth cut upon the edges. For a delineation of these type, reference is made to sections thereof in figures 1 and 3, upon the annexed drawings, marked example 6.

The type cases are of wood, or of any other material, with small compartments of the exact length of the type, for greater convenience in distributing, and resembling those in common use among printers.

The type rules are of wood or metal, or either material that may be preferred, and about three feet in length, with a groove, into which the type, when used, are placed; on the under side of each type rule are cogs, by which they are adapted to a pinion wheel having corresponding cogs, and forming part of a port rule. The type rule in use is moved outward, as motion is given to the said wheel. A delineation of the type rule is contained in the annexed drawing, marked example 7.

The straight port rule consists of a pinion wheel before mentioned, turned by a hand-crank attached to a horizontal screw that plays into the cogs of the pinion wheel, as the latter do into the cogs of the type rule, or by any other power in any of the well known methods of

mechanism. It is connected with a railway or groove, in and by which the type rule, from the motion imparted to it by said wheel, is conveyed in a direct line beneath a lever that breaks and connects the galvanic circuit in the manner hereafter mentioned. A delineation of said wheel, crank, and screw is contained in the drawing hereunto annexed, marked example 8, figures 1, 2, 3.

The circular port rule is a substitute, when preferred for both the type rule and the straight port rule, and consists of a horizontal or inclined wheel, example 9, fig. 1, A, of any convenient diameter of wood or metal, having its axis connected on the under side of the wheel with a pinion wheel, K, and as in the case of the straight port rule. It is moved by the motion of the pinion wheel, as is the type rule in the former description. On the entire circumference of said horizontal or inclined wheel, and upon its upper surface, is a shoulder or cavity, a, fig. 1, 2, corresponding in depth with the thickness of the type used, and in width, b, equal to that of the type, exclusive of their teeth or indentations. Near the outer edge of the surface of said shoulder or cavity are cogs, c, throughout the circumference of the wheel, projecting upwards, at a distance from each other equal to one-half of the width of the teeth or indentations of the type, and otherwise corresponding in size to the width and depth of the groove, D, D, fig. 4, in the under side of the circular type before described, and illustrated by reference to example 6, figures 1 and 3. Directly over said shoulder or cavity and cogs, and at one or more points on the circumference of said wheel, is extended, from a fixture outside of the orbit of the wheel, a stationary type feeder, E, fig. 1, formed of one end e, and one side, E, perpendicular, of brass or tin plate, or other substance, and of interior size and shape to receive any number of the type, which are therein deposited, with their indentations projecting outward, as in fig. 2, and their grooves downward, as in fig. 4. Said type feeder is so suspended from its fixture F F, over the shoulder or cavity of the wheel A before described, as to admit of the passage under it of said wheel, in its circuit, as near the bottom of the feeder as practicable, without coming in contact therewith. The type deposited in the feeder, as before mentioned, form a perpendicular column, as in fig. 2, the lower type of which rests upon the surface of the before named shoulder of the wheel B, fig. 2, and the cog of the wheel projecting upward enters the groove, D D, fig. 4, of the type hereinbefore described. The operation of said circular port rule, in regulating the movement of the type in use, is as follows: when the wheel A is set in motion, the type resting immediately upon the shoulder of the wheel, in the manner mentioned above, as in fig. 2, is carried forward on the curvature of the wheel from beneath, the column of type resting upon it in the stationary type feeder, by means of one of the before named cogs coming in contact with that point D, fig. 3. example 6, in the groove of the type hereinbefore described as forming the termination of said groove, and which is particularly delineated at

the points D D in the annexed drawing, marked example 6, figure 3. As by said process the lower type in the column that is held by the stationary feeder is carried forward and removed, the next type settles immediately upon the shoulder of the wheel, and after the manner of the removed type is brought in contact with another cog of said shoulder, within the groove of the type, and thence carried forward from beneath the incumbent column, as was its predecessor; then follows consecutively in the same method each type deposited within the feeder, so long as the wheel is kept in motion. The deposite of the type in the stationary feeder is regulated by the order in which the letters, or numerals, or words they represent, are designed to be communicated at any distant point or points. After the type is respectively carried forward on the curvature of the wheel in the manner stated above, beyond the point where they are acted upon by the signal lever, as is hereinafter described, they are lifted, each in its turn, from the shoulder of the wheel A, and cast off in a box, or pocket G, below the wheel, by means of a slender shaft, or spindle H, made of any metal, and resembling in form a common ploughshare, extending downward from a fixture O placed outside of the wheel into a groove K, within the before named shoulder of said wheel A, and on the inner side of the cogs c, already described. By means of said groove, the downward point of said shaft, or spindle H, is brought within the curvature and below the surface of said shoulder b, fig. 2, and consequently under the approaching end of the type; so that each type, successively, as it is carried forward on said curvature in the manner before described, is lifted from the shoulder, and forced upward on the inclined shaft or spindle by the type in contact with it at the other end, until turned off into the before named box, or pocket G, below, ready for a redistribution. For a more particular delineation of the several parts of said circular port rule, reference is made to the annexed drawing, marked example 9, figures 1 and 2.

The signal lever, example 9, fig. 3, consists, 1st, for use with the straight port rule, ex. 8, fig. 1, A, of a strip of wood of any length, from six to twenty-four inches, resting upon a pivot a, or in a notched pillar formed into a fulcrum by a metal pin a, passing through it and the lever. At one end of the lever a metallic wire, bent to a semi-circular or *or* half square form, as at A, or resembling the prongs of a fork distended, is attached by its centre, as described in the annexed drawing, example 8, at the point marked A. Between said end of the lever and the fulcrum a, and near the latter, on the under side of the lever A, is inserted a metallic tooth or cog b, curved on the side nearest to the fulcrum, and in other respects corresponding to the teeth or indentations upon the type already described. On the opposite extremity of the lever is a small weight, c, to balance or offset in part, when needed, the weight of the lever on the opposite side of the fulcrum. The lever thus formed is stationed directly over the railway or groove D D, heretofore described as forming a connected part of the straight port rule. The movement of the type rule brings the tooth of each

type therein set in contact with the tooth or cog of the lever, and thereby forces the lever upward, until the points of the two teeth in contact have passed each other, when the lever again descends as the teeth of the type proceeds onward from the tooth of the lever. This operation is repeated as frequently as the teeth of the type are brought in contact with the tooth of the lever. By thus forcing the said lever upward and downward, the ends of the semi-circular or pronged wire are made alternately to rise from and fall into two small cups or vessels of mercury, E E; in each of which is an end or termination of the metallic circuit conductors, first described above. This termination of the metallic circuit in the two cups or vessels breaks and limits the current of electricity or galvanism through the circuit; but a connexion of the circuit is effected or restored by the falling of the two ends of the pronged wire A, attached to said lever, into the two cups connecting the one cup with the other in that way. By the rising of the lever, and consequently the wire upon its end, from its connexion with said cups, said circuit is in like manner again broken, and the current of electricity or galvanism destroyed. To effect at pleasure these two purposes, of breaking and connecting said circuit, is the design of said motion that is imparted in the before mentioned manner to said lever; and to regulate this motion and reduce it to the system of intelligible signs, before described, is the design and use of the variations in the form of the type, also before described. A plate of copper, or silver, or other conductor, connected with the broken parts of said circuit of conductors, and receiving the contact of the wire attached to said lever, may be substituted, if preferred, for said cups of mercury. For a particular delineation of the several parts of said lever, reference is made to the annexed drawing, marked example 8.

The signal lever consists, 2ndly, for use with the circular port rule, exam. 9, fig. 3, of a strip of wood G, with a metallic wire A at one end of the form, and for the purposes of the lever already described above. It turns on a pivot or fulcrum a, placed either near the middle or in the end of the lever. At the end of the lever at C, opposite to the metallic wire A and elbow C, is formed on a right angle with the main lever, and extending downward from the level with the pivot or fulcrum sufficiently for a metallic tooth H in the end thereof, corresponding with the teeth or indentations of the type already described, to press against the type projecting from the shoulder or cavity of the wheel A, fig. 1, that forms the circular port rule, before described. Said wheel is placed beneath said lever, as seen at G, fig. 1, in a position to be reached by the extremity or tooth H of the arm of the lever just mentioned. The tooth H in the arm of the lever is kept in constant contact with the type of the circular port rule, by the pressure of a spring B upon it, as described in the annexed drawing, marked example 9; at B, figures 1 and 3, in the same example, exhibit sections of the said lever. The action thus produced by the contact of the teeth of the type in the port rule, when said wheel is in motion, with the tooth in the arm of the lever, lifts up and drops down the opposite extremity A

of said lever, having the metallic wire upon it, as the tooth of said lever passes into or out of the indentations of the type, and in the same manner and to the same effect as the first described lever rises and falls, and accordingly breaks and closes the circuit of conductors, as in the former instance. In the use of this circular port rule and its appropriate lever, fig. 3, type may be used, having the points of their teeth and their indentations shaped as counterparts, or reverses, to those delineated in the annexed drawing, heretofore referred to, and marked examples 4, 5, and 6; and thereby the forms of the recorded signs will be changed in a corresponding manner.

The register consists, 1st, of a lever, of the shape of the lever connected with the circular port rule above described, and is delineated in the annexed drawing, marked example 10, figures 1, 2, and 4, at A. Said lever A operates upon a fulcrum a, that passes through the end that forms the elbow a, upon the lower extremity of which, and facing an electro-magnet, is attached the armature of a magnet f. In the other extreme of the lever, at B, is inserted one or more pencils, fountain pens, printing wheels, or other marking instruments, as may be seen in the figure 4 of example last mentioned, at letter B. The magnet is at letter c in the same figure.

2ndly. Of a cylinder, or barrel of metal or wood, and covered with cloth or yielding coating, to turn upon an axis, and occupying a position directly beneath the pencil, fountain pen, printing wheel, or other marking instrument, to be used, as exhibited in the last mentioned example of drawings, figure 4, D. Two rollers, marked b, b, in said figure of drawings, are connected with said cylinder, on the upper side curvatures thereof, and being connected with each other by two narrow bands of tape passing over and beneath each, near the ends thereof, and over the intervening surface of the cylinder, in a manner to cause a friction of the bands of tape upon the latter when in motion, as delineated in the last named example, figure 4, at points marked c, c, c. The distance between said bands of tape on the rollers is such as to admit of the pencil, or other marking instrument in the lever, to drop upon the intervening space of the cylinder. Near by said cylinder is a spool, to turn on an axis, and marked d, in the said figure, to receive any desired length of paper or other substance, formed into slips, or a continuous ribbon, and for the purpose of receiving a record of the signs of intelligence communicated. When the register is in motion, one end of the paper on said spool being inserted between the under surfaces of said two rollers, under the strips of tape that connect them and the cylinder, it is drawn, by the friction or pressure thus caused upon it, forward from said spool gradually, and passed over said cylinder, and is thence deposited in a box on the opposite side, or is cut off at any desired length as it passes from the cylinder and rollers.

3dly. Of an alarm bell A, ex. 10, fig. 5, which is struck by means of a lever hammer B, that is acted upon by a moveable cog b, placed upon an axis or pin b, that confines it in the lower extremity of a pendulum lever, marked E, in fig. 5, of example 10, having an armature of

a magnet attached to it at d, and acted upon by an electro-magnet O placed near it and the before named magnet, and in the same circuit of conductors with the latter; said cog b moves in a quarter circle only, as the motion of said arm of the lever passes backward and forward in the act of recording as hereinafter described. When forced into a horizontal position in said quarter circle it ceases to act upon the hammer; but when moved from a perpendicular position, it presses upon the projection in the end of the hammer, causing the opposite end of the hammer to be raised; from which elevation it again falls upon a stationary bell A, as soon as said cog reaches a horizontal position and ceases, as before mentioned, to press upon the hammer. Thus a notice by sound or an alarm is given at the point to which intelligence is to be communicated as soon as the register begins to act, and such sound may be continued or not, at pleasure, for the purpose mentioned, or for any other uses, as the hammer shall be suspended or not from contact with the bell, or with any number of bells that may be employed. Figure 5 of said example, marked 10 in the annexed drawing, represents sections of said hammer and bell; said several parts of the register are set in motion by the communication to or action upon the before named armature of a magnet attached to the lever of the register of the electro or galvanic current in the circuit of conductors, and from an electro-magnet in said circuit, as before described, stationed near the said armature. As said armature is drawn or attracted from its stationary and horizontal position towards the said magnet, when the latter is charged from the circuit of conductors, said lever is turned upon its fulcrum, and the opposite end thereof necessarily descends and brings the pen or marking instrument, which it contains, in contact with the paper or other substance on the revolving cylinders directly beneath it. As said armature ceases to be thus drawn or attracted by said magnet, as is the case as soon as said magnet ceases to be charged from the circuit of conductors, or as the current in said circuit is broken in the manner hereinbefore described, the said armature is forced back by its own specific gravity, or by a spring or weight, as may be needed, to its former position, and the pen or marking instrument in the opposite end of the lever is again raised from its contact with the paper or other substance on the before named revolving cylinder. This same action is communicated simultaneously from the same circuit of conductors to as many registers as there are corresponding magnets provided within any circuit and at any desired distances from each other.

The cylinder and its two associated rollers are set in motion simultaneously with the first motion of the lever, by the withdrawal of a small wire or spindle z, ex. 10, figs. 2 and 5, from beneath one branch of a fly-wheel K, that forms a part of the clock machinery hereafter named. Said wire g is withdrawn by the action upon said wire of a small electro-magnet O, figs. 2 and 5, stationed in the circuit and near the large magnet before named, as delineated in figure 5 of example 10. Said cylinder and rollers are subsequently kept in motion by a train of wheels, similar to common clock wheels, as in figs. 2 and 3,

acted upon by a weight raised, as occasion may require, by a hand crank, and their motion is regulated by the same wheels to correspond with the action of the registering pen or marking instrument. Said train is represented in figures 1, 2, and 3, of said example 10.

The electro-magnet thus used is made in any of the usual modes, such as winding insulated copper wire, or strips of copper or tin foil or other metal, around a bar of soft iron, either straight or bent into a circular form, and having the two extremities of the coils connected with the circuit conductors, so that the coils around the magnet make part of the circuit.

To extend more effectually the length of any desired circuit of conductors, and to perpetuate the power of the electric or galvanic current equally throughout the same, I adopt the following mode, and also for connecting and using any desired number of additional and intervening batteries or generators of said current, and for connecting progressively any number of consecutive circuits, viz: Place at any point in a circuit an electro-magnet of the denomination already described with an armature upon a lever of the form and structure, and in the position of that used at the register, to hold and operate the marking instrument, with only a substitution therein for such marking instrument of a forked wire A, exam. 9, fig. 3, like that upon the end of the signal lever heretofore described; directly beneath the latter wire place two cups of mercury, EE, on two metallic plates, joined to terminations of a circuit, lead in from the fresh or additional battery or generator of said circuit, in the same manner as they are to be provided in the first circuit of conductors at the points where the cups of mercury are hereinbefore described. As the current in the first circuit acts upon the magnet thus provided, the armature thereof and lever are thereby moved to dip the forked wire A into the cups of the second circuit, as in the circuit first described. This operation instantly connects the break in said second circuit, and thus produces an additional and original power or current of electricity or galvanism from the battery of said second circuit to the magnet or magnets placed at any one or more points in such circuit, to be broken at pleasure, as in the first circuit, and from thence by the same operation the same results may again be repeated, extending and breaking at pleasure such current through yet another and another circuit ad infinitum, and with as many intervening registers for simultaneous action as may be desired, and at any distances from each other.

The dictionary, or vocabulary, consists of words alphabetically arranged and regularly numbered, beginning with the letters of the alphabet, so that each word in the language has its telegraphic number, and is designated at pleasure through the signs of numerals.

The modes which I propose of insulating the wires or other metal for such conductors, and of laying the circuits, are various. The wires may be insulated by winding each wire with silk, cotton, flax, or hemp, and then dipping them into a solution of caoutchouc, or into a solution of shellac, or into pitch, or rosin and caoutchouc. They may be laid through the air; enclosed above the ground; in the ground, or in the

water. When through the air, they may be insulated by a covering that shall protect them from the weather, such as cotton, flax, or hemp, and dipped into any solution which is a non-conductor, and elevated upon pillars. When enclosed above the ground they may be laid in tubes of iron or lead, and these again may be enclosed in wood, if desirable. When laid in the ground, they may be enclosed in iron, leaden, wooden, or earthen tubes, and buried beneath the surface. Across rivers, the circuit may be carried beneath the bridges, or, where there are no bridges, enclosed in lead or iron, and sunk at the bottom, or stretched across, where the banks are high, upon pillows, elevated on each side of the river.

What I claim as my invention, and desire to secure by letters patent, is as follows:

1st. The formation and arrangements of the several parts of mechanism constituting the type rule, the straight port rule, the circular port rule, the two signal levers, and the register lever, and alarm lever with its hammer, as combining, respectively, with each of said levers, one or more armature of an electro-magnet, and as said parts are severally described in the foregoing specification.

2dly. The combination of the mechanism constituting the recording cylinder, and the accompanying rollers and train wheels, with the formation and arrangement of the several parts of mechanism, the formation and arrangement of which are claimed as above, and as described in the foregoing specification.

3dly. The use, system, formation, and arrangement of type, and of signs for transmitting intelligence between distant points by the application of electro-magnetism and metallic conductors, combined with mechanism, described in the foregoing specification.

4th. The mode and process of breaking and connecting by mechanism currents of electricity or galvanism in any circuit of metallic conductors, as described in the foregoing specification.

5th. The mode and process of propelling and connecting currents of electricity or galvanism in and through any desired number of circuits of metallic conductors from any known generator of electricity or galvanism, as described in the foregoing specification.

6th. The application of electro-magnets, by means of one or more circuits of metallic conductors from any known generator of electricity or galvanism, to the several levers in the machinery described in the foregoing specification, for the purpose of imparting motion to said levers, and operating said machinery, and for transmitting, by signs and sounds, intelligence between distant points, and simultaneously to different points.

7th. The mode or process of recording or marking permanently signs of intelligence transmitted between distant points, and simultaneously to different points, by the application and use of electro-magnetism or galvanism, as described in the foregoing specification.

8th. The combination and arrangement of electro-magnets, in one or more circuits of metallic conductors, with armatures of magnets,

for transmitting intelligence by signs and sounds, or either, between distant points, and to different points simultaneously.

9th. The combination and mutual adaptation of the several parts of the mechanism and system of type and of signs, with and to the dictionary or vocabulary of words, as described in the foregoing specification.

In testimony whereof I, the said Samuel F. B. Morse, hereto subscribe my name in the presence of the witnesses whose names are hereto subscribed, on the 7th day of April, A. D. 1838.

SAM'L F. B. MORSE.

Witnesses, B. B. FRENCH,
CHARLES MUNROE.

Examined.

The patent of the 15th of January, 1846, to Samuel F. B. Morse, is as follows, to wit:

Patent of 15th January, 1846, to Morse.

The United States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify, that the annexed is a true copy from the record of this office.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this thirteenth day of September, in the year of our Lord one [L. S.] thousand eight hundred and forty-seven, and of the independence of the United States the seventy-second.

EDMUND BURKE.

No. 79.

The United States of America, to all to whom these letters patent shall come:

Whereas Samuel F. B. Morse, New York, has alleged that he has invented a new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism, for which letters patent were granted, dated June 20th, 1840, and which letters patent are hereby cancelled on account of a defective specification, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are, therefore, to grant, according to law, to the said Samuel

F. B. Morse, his heirs, administrators, or assigns, for the term of fourteen years from the twentieth day of June, one thousand eight hundred and forty, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Samuel F. B. Morse in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent office has been hereunto affixed. Given under my hand at the city of Washington, this fifteenth [L. S.] day of January, in the year of our Lord one thousand eight hundred and forty-six, and of the independence of the United States of America the seventieth.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent office.

EDMUND BURKE,
Commissioner of Patents.

The schedule referred to in these letters patent and making part of the same.

Schedule.

To all whom these presents shall come:

Be it known, that I, Samuel F. B. Morse, of the city, county, and State of New York, have invented a new and useful apparatus for, and system of, transmitting intelligence between distant points by means of electro-magnets, which put in motion machinery for producing sounds or signs, and recording said signs upon paper or other suitable material, which invention I denominate the American Electro-magnetic Telegraph, and that the following is a full, clear, and exact description of the principle or character thereof, which distinguishes it from all other telegraphs previously known, and of the manner of making and constructing said apparatus, and applying said system, reference being had to the accompanying drawings, making part of this specification, in which example 1 is a sample of signs intended for numerals; example 2, signs for compound numerals; example 3, are signs for letters; examples 4, 5, and 6, are specimens of the form of types used; example 7, is the type rule; example 8, apparatus for connecting and breaking the electrical or galvanic circuit; example 9, is a modified apparatus for the same purpose; example 10, figure 1, is a perspective view of the registering apparatus; figure 2, a top plan; figure 3, a side elevation of the train of wheels for moving the paper and regulating its motion; figure 4, a sectional elevation of the registering lever and parts appended thereto; figure 5, alarm apparatus; example 11, a diagram showing the relative positions of the different parts of an approved form of apparatus.

It has heretofore been essayed to use the currents of electricity or galvanism for telegraphic purposes, either by decomposition or the action or exercise of the deflective force of a current upon a magnetized bar or needle, which decomposition or deflection required to be noted by ocular inspection at the instant the sign was made. By my invention the intelligence can be transmitted and imprinted on paper or other suitable substance without requiring the aid of any person at the station to which the communication is transmitted, so as to be read at any time thereafter.

The apparatus consists of two principal parts connected by wires, (as shown in the diagram, No. 11,) or other suitable galvanic or electric conductors to form a circuit, in which is placed any suitable generator of galvanism or electricity, as the inducing power. The first part of my telegraph is for communicating intelligence to the second, where it is recorded, and consists of apparatus for making and breaking the circuit above named at any convenient point in the circuit generally near the generator; a break is made in the *conduc*, and the two ends thereof are immersed in mercury cups, as shown in the drawings at (EE,) fig. 1, example 8; to connect the circuit, I employ an inverted V formed piece of metal, or other proper conductor, (A,) suspended over the mercury cups (EE,) on the end of a horizontal lever, denominated in said drawing the "signal lever," whose fulcrum is at (a;) so that when the connector (A) is dipped into the cups, the circuit is completed; between the fulcrum and connector (A,) there is affixed to the under side of the lever, and projecting downwards, a triangular tooth (b,) which bears on the upper surface of the types about to be described, and is raised and lowered by them; the lever may be counterbalanced as at (C,) to make it more easy. The types are composed of flat straight strips of metal, as shown in examples 4 and 5 of the drawings hereunto annexed, having their upper edges indented to suit the character to be represented, and which will be hereinafter more fully set forth in the description of the operation of the machine. The indentations are sufficiently deep to allow the connector (A,) to be plunged into the mercury cups, and the highest surface raises it from them. It is obvious that the forms of the upper surface of the types may be reversed, and the cog (b) placed on the other side of the fulcrum, and the same effect be produced. The types are set up and confined in a rule, to form any required sentences in one long line; this rule, which in the drawing, example 8, is denominated a "type rule," has on its under side a rack, that gears into a pinion (x) on a shaft under the grooved railways D, of common construction, on which said rule slides, and is directed under the cog (b) on the lever; the types are advanced at a regular speed by the application of any convenient power to the pinion (x,) and being notches in them successively under the cog. Other modifications of this apparatus can be made, some of which are shown in the drawings, example 9, in which is represented what I denominate a circular port rule, in which the type are made to surround a disc (A) radially; the

other parts of the apparatus being made to correspond; in this modification there may be a stationary hopper, or type feeder, (E) into which the types are placed flatways, one above another, as shown at figure 2, placed over the space that is to receive the types on the disk (A,) and as the disk revolves, the types placed in the feeder fall successively into place on the disk, and are carried past the signal lever where they act, and are then carried off from the disk by a guide (H) into a receiver (G); many other devices have been suggested for effecting the same object, viz., making and breaking the circuit, but I believe these examples will illustrate the principle. The mercury cups may be dispensed with, and suitable metal plates substituted therefor. The second part of my apparatus is for registering the signals, or sentences, communicated from the station where the apparatus heretofore described is situated, and consists of an electro-magnet, which is in, and connected with, the above described circuit, and clock work for moving the paper or other registering medium, and an alarm may also be appended. The electro-magnet may be of any convenient construction, and will be charged every time the circuit is closed as above, and discharged when it is broken. Opposite the bars of the electro-magnet, example 10, (c,) is placed an armature (f) suspended on the upright arm of a bent lever (A,) the fulcrum of which is at (a,) (this is most clearly represented in section fig. 4;) to the end of the horizontal arm of this lever there is attached one or more pencils, fountain pen, or other suitable marking instruments, directly under which is placed a suitable cylinder (D,) over which the paper passes on which the register is made. This cylinder turns on its axis, and is connected by a train of wheels and pinions, with a barrel (m) of common construction, which is driven by a common weight and cord wound thereon, and also with a fly (k,) which regulates its motion. Near the cylinder (D) a reel or spool (d) is placed, on which a strip of paper is wound, the end of which is carried over the cylinder (D,) and is confined thereon by means of two tapes, or endless bands, one at each edge, which passes around two pullies, (bb,) one on each side of cylinder (D,) this is clearly represented in figures 2 and 4; by this arrangement it will be seen that when the electro-magnet is charged, the marking instrument will be brought down on to the paper, (which is at the same time put in motion by removing a wire, (g,) which is so connected with the armature that it can be drawn back from the fly, (k,) and allow it to turn, see figs. 4 and 5, and makes a mark longer or shorter, according to the time the circuit is closed.

My system of characters consists of dots and lines variously combined to form letters and other characters, a specimen of which is represented in examples 1, 2, and 3. To make a dot, a notch is required in the types, into which the cog on the "signal lever" will fall, and instantly rise from as the type moves on, and when a line is to be formed, the notch in the type is extended, so that the lever will remain down for a space of time sufficient to make the line required. The alarm bell shown at (A,) example 10, fig. 5,) is struck by means of a hammer actuated by a sup-

plementary electro-magnet placed in the same circuit as that first named; the machinery for this purpose may be variously modified, and therefore no particular description need be given. Any convenient number of registering stations may be connected with the same circuit, all constructed and operating as above described.

To extend more effectually the communication by my apparatus, I adopt the following arrangement, whereby I can use any number of additional batteries or generators of said current, and by which I can connect, progressively, any number of consecutive circuits, viz: I place at any point in the first circuit an electro-magnet, with an armature opposite, on a lever like that described for registering; but instead of the marking instrument I attach to the end of the lever a conductor, such as is described on the first or "signal lever;" this connects the conductor of a new circuit attached to another battery, and this might be continued on ad infinitum.

The conductors may be insulated in any convenient way, and may be extended above or below the surface of the earth as shall be found most desirable, and sustained or enclosed by any suitable construction.

It will be observed, that any vocabulary, system of signs, or secret writing by cypher, can be conveniently used in communicating by this telegraph, and any mode of making or breaking the circuit can be adopted, the object being to do so at proper intervals.

Having thus fully described my invention, I wish it to be understood that I do not claim the use of the galvanic current or currents of electricity for the purpose of telegraphic communication; but what I specially claim as my invention and improvement, is making use of the motive power of magnetism, when developed by the action of such current or currents, as a means of operating or giving motion to machinery which may be used to imprint signals upon paper or other suitable material, or to produce sounds in any desired manner for the purpose of telegraphic communication. The only ways in which the galvanic current has heretofore been proposed to be used is by decomposition, and the action or exercise of the deflective force of a current upon a magnetized bar or needle, and the decompositions and deflections thus produced were the subject of inspection, and had no power of recording the communication. I therefore characterize my invention as the first recording or printing telegraph by means of electro-magnetism. There are various known modes of producing motions by electro-magnetism, but none of these have hitherto been applied to actuate or give motion to printing or recording machinery, which is the chief point of my invention and improvement.

I also claim the system of signs, consisting of dots and lines substantially as herein set forth and illustrated in combination with the telegraph for recording signals.

I also claim the types and rule in combination with the signal levers as herein described, for the purpose of connecting and breaking the current of galvanism and electricity.

I also claim, in combination with an electro-magnet used for tele-

graphic purposes, the train of clock-work, actuated by a weight or spring, for the purpose of carrying the material on which the record is to be made under the registering pen, substantially in the manner specified.

I also claim the combination of two or more circuits of galvanism or electricity generated by independent batteries, by means of electro-magnets, as above described.

In testimony whereof I have hereunto subscribed my name this twenty-seventh day of December, 1845, to the above amended specification of the invention for which letters patent were granted to me on the twentieth day of June, 1840.

SAML. F. B. MORSE.

Witnesses:

JAMES MACGREGGOR, jr.,
A. P. BROWNE.

Ex'd.— J. J. ROANE.

The patent to Saml. F. B. Morse, of the 11th April, 1846, is as follows, to wit:

Patent to Morse, dated 11th April, 1846.

The U. States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office.

J. EDMUND,
Commissioner of Patents.

No 4453.

THE UNITED STATES OF AMERICA:

To all whom these letters patent shall come. Whereas, Samuel F. B. Morse, New York, has alleged that he has invented a new and useful improvement in electro-magnetic telegraphs, which, he states, has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowlege and belief, been previously known or used; has paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Samuel F. B. Morse, his heirs, administrators, or assigns, for the term of fourteen years from the eleventh day of April, one thousand eight hundred

and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Samuel F. B. Morse in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof I have caused these letters to be made [L. S.] patent, and the seal of the Patent office has been hereunto affixed.

Given under my hand, at the city of Washington, this eleventh day of April, in the year of our Lord one thousand eight hundred and forty-six, and of the independence of the United States the seventieth.

N. P. TRIST,
Acting Secretary of State.

Countersigned and sealed with the seal of the Patent office.

EDMUND BURKE,
Commissioner of Patents.

Schedule part of patent of 11*th April*, 1846.

The schedule referred to in these letters patent, and making part of the same.

Be it known that I, S. F. B. Morse, of New York, in the county of New York, and State of New York, have invented a new and useful improvement in the electro-magnetic telegraph; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation thereof, reference being had to the accompanying drawings, in which fig. 1 is a vertical longitudinal view through the machine, fig. 2 is a top plan, fig. 3 is a side elevation.

The construction of my apparatus is as follows: In the section fig. 1, A represents the base, which is an oblong plank, to which all of the other parts are affixed. Near one end of said base are two upright standards, shown in the figures, and lettered (y); these standards are represented by harp-shaped castings, which are placed a little distance apart, and support the journals of a short cylinder near their top, around which a strip of paper (12) is wound, of any length, and from it is supplied to the machine as hereinafter described.

Near the centre of the base A is situated the electro-magnet of the register, which is constructed as follows: Two round bars of soft iron are each placed in a coil of insulated copper wire, C, the lower ends of said bars, B^1, being connected by a crossbar, D, extending from one to the other, through which they pass, and to which they are secured by screws, which are screwed on to them; the upper ends of these bars above the coils curve inward towards each other, coming nearly together without touching, as shown at B^2, fig. 4, and the extreme ends are turned upwards, as shown at F, same fig., just in front of the coils C, above named. There is affixed to the base an upright standard, H, through which a bolt, I, is put horizontally, with its head

against a plate, J; between it and standard H this bolt passes through between the two coils, C, and also through a crossbar, L, that extends from one coil to the other. On its end a screw is cut, on which a nut, K, is screwed, which secures the two coils and the soft iron bars firmly in their places. Each of the coils of wire have wooden heads or cheeks above and below, with binding wires extending from one to the other, for the purpose of keeping the wire together. On the top of the standard H there is a crossbar, Q, permanently attached to said standard, and having in each end a thumb-screw, lettered O and P, the ends of which extend down nearly to the lever MM, directly under said bar, Q, which I denominate the pen lever. One arm of this lever projects over the soft bars above named, where an armature, G, of soft iron is attached to it, that extends over the surface of the ends of both bars, B^2, of the electro-magnet as shown in the plan, fig. 2; to the other end of the lever three more or less points, 5, are affixed that project upward toward a steel roller, 4, directly under the centre thereof, as hereafter described; the extent of the vibration of the lever M, is regulated by thumb-screws, O and P, above named, its pivot, (h), being in the standard, H; the screw, O, is for limiting the upward motion of the pen or points, 5 and P; their downward motion, a spring, (S), being used to draw them down.

A suitable frame is secured to the same base, A, as the other parts above described, which contains the clock work for supplying the paper from the roll. Said clock is composed of a cylinder or barrel, (x), on which a cord, 10, is wound, to which a weight, 11, is suspended; on the barrel, at one end, is a ratched wheel, (x′), and on the same shaft as the barrel there is a spur wheel, (x″), with a spring click similar to a common clock. This wheel connects, by means of a multiplying gearing, with the cylinder 3, upon which is pressed a cylinder, 2, by means of a spring, V, which passes over the top of the frame, its ends turning down and resting on the journals of cylinder 2, figs. 2 and 3, and holds down the upper roller; the pressure of this is regulated by screws, W, on top. These cylinders draw the strip of paper, 12, between them, after it has passed under a cylinder, 4, placed over the pens above described, in which cylinder are grooves, (4^1), cut directly opposite the points.

In addition to the above described machine, there is what I denominate a receiving magnet of the following construction and use; it is represented in fig. 2 and 3, and consists of a bar of soft iron (f^1;) the two ends (f^2, f^3) of which are turned up at right angles; and said ends are made larger in diameter than the lower horizontal part (f^1), which may be flat; on the upper end of one of the uprights (f^2) is bolted a horizontal bar (g^2) that extends out to a point just beside the other upright (f^3), (more clearly shown in the outline fig. 2), and its end turns up at the same distance from (f^2) as the end of (f^3;) the upper end of the upright (f^3) and bar (g^2) are on a level with each other, and they are chamfered off on the sides from each other, so as to have the face of the upper ends smaller than the body of the bars, and adjacent to each

other; around each of the uprights (f^2, f^3) there is a large flat coil of wire, consisting of a wire of considerable length, say one mile, more or less, in each coil; these coils connect with a battery (c) fig. 3, at the other station by a wire from one of the coils, and with the ground as a conductor to the other, as hereafter described; the circuit can be broken or closed by an apparatus consisting of a straight lever or key (d) figs. 2 and 3, to one end of which, one wire (g^1) fig. 3 is connected, and a boss of metal (e) composing the anvil is attached to the other wire (e^1) forming the rest of the circuit; when the hammer on the lever (d) is brought down on the anvil, it closes the circuit by which the bar (f^2, f^3) of the receiving magnet at the opposite station is magnetized; this attracts a keeper or armature (d″) on the short arm of the straight metal lever (d′) suspended on the metal standard (d^4) above it, which causes the long arm of said lever to rise and come in contact with a brass adjusting screw (h) placed above and near its end, to which is attached the wire leading to one pole of the local battery (k) the wire (i′, i″) from the other pole of said battery, is connected with *with* the metal standards (d^4) that support the journals of lever (d^1) and thus completes the circuit which has the electro-magnet B in it for writing, by which any amount of power can be obtained that is required to enable the said magnet to draw down the armature G above described, which causes the points 5 to mark on the paper 12, see fig. 1. To the arm M of the pens a break 8, which is a common plain lever, is attached by means of a connecting rod 6, so as to be raised from a friction pulley, when the pen is made to mark, and let off the clock work attached thereto, which puts the paper in motion; this break 8 is attached to the shaft 7, placed a little above the friction pulley 9, that is connected with the clock work on which said break acts on the same shaft 7; with the break there is a pulley (z) connected by an endless band, with a smaller pulley on the shaft of the barrel on which the weight cord is wound; this causes the break when raised by the lever M slowly to descend till it strikes the friction pulley (9) and stops the clock work after a sufficient quantity of paper has been run off by its action to form the spaces for the longest rests between the motions of the pen lever M, and thus keeping the break up till the writing ceases; after which it gradually descends, and the machine is stopped.

The red and black lines, fig. 3, show the relative positions of the apparatus; in connexion with a circuit of wire (a) is a copper plate buried in the ground from which a wire (h) ascends to the battery (c); this I denominate the main battery; from thence the wire extends to a receiving magnet (f), described in a former section and represented at (f), figs. 1 and 3; from thence a wire (e′) is continued to the opposite station, and is there connected with the anvil (e) of the key (d) as above described, and thence to another plate of copper (g) in the ground connecting this circuit by means of the key (d), magnetizes the receiving magnet, and causes the lever (d′) to move, which closes the circuit of wire (i) connected with a local battery (k) and magnetizes the soft bars B, of fig. 3, acting on the pen lever which causes it to mark on the paper.

The economy of the galvanic power by the introduction of the receiving magnet is obvious; when the extent of the telegraphic line is very great, the resistance to the passage of the galvanic current is proportionably increased, and an enormous battery would be required to operate the pen by means of the register or local magnet, which is of small dimensions, and has a comparatively short extent of wire around it; but I have discovered that by using a very long coil of wire, as in the receiving magnet, there is a sufficiently powerful magnet produced, notwithstanding the length of the telegraphic line may be very great, by means of a small galvanic battery. The same extent of galvanic battery that would produce no available magnetism in the register magnets, charges the receiving magnet to such an extent as to enable me to produce motion, and thus at pleasure to make and break the circuit of the small local battery, which being on the spot, and charging the register magnet, gives me perfect control over it and the apparatus connected with it. Thus I resort to two magnets and two batteries, of such relative characters as I have described, to effect a communication through any distance I desire, without increasing to any considerable degree the size of the main galvanic battery, which is in itself a great source of expense.

What I claim as my invention, and desire to secure by letters patent, is the receiving magnet, or a magnet having a similar character, that sustains such a relation to the register magnet or other magnetic contrivances for registering, and the length of current or telegraphic line, as will enable me to accomplish, with the aid of a main galvanic battery and the intervention of a local battery, such motion or power for registering as could not be obtained otherwise without the use of a much larger galvanic battery.

I claim as my invention the use of a local battery and magnet, in combination with a battery and magnet connected with the main line or lines of conductors, for the purpose above specified.

I also claim the combination of the apparatus connected with the clock work for setting off the paper, and stopping it with the pen lever M.

I also claim the combination of the points affixed in the pen lever with the grooved roller (N) for marking on paper as above described.

SAMUEL F. B. MORSE.

Witnesses—

ALFRED VAIL,
J. G. GREENOUGH.

The patent of the 13th June, 1848, to Samuel F. B. Morse, is as follows, to wit:

Patent to Morse, 13th June, 1848.

The U. States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this seventeenth day of June, in the year of Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-second.

[L. S.]

EDMUND BURKE.

No. 117.

The United States of America, to all to whom these letters patent shall come:

Whereas Samuel F. B. Morse, Poughkeepsie, New York, has alleged that he has invented a new and useful improvement in [the] mode of communicating information by signals by the application of electro-magnetism, (for which letters patent were granted on the 20th of June, 1840; which letters patent were surrendered and reissued on the 15th day of January, 1846; which last letters patent are hereby cancelled on account of a defective specification;) which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Samuel F. B. Morse, his heirs, administrators, or assigns, for the term of fourteen years, from the twentieth day of June, one thousand eight hundred and forty, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement; a description whereof is given in the words of the said Samuel F. B. Morse in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent office has been hereunto affixed.

[L. S.]

Given under my hand at the city of Washington, this thirteenth day of June, in the year of our Lord one thousand eight hundred and forty-eight, and of the independece of the United States of America the seventy-second.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent office.

EDMUND BURKE,
Commissioner of Patents.

Ex'd.—J. J. R.

Schedule to patent of 13th June, 1848.

The schedule referred to in these letters patent, and making part of the same:

To all to whom these presents shall come:

Be it known, that I, Samuel F. B. Morse, now of Poughkeepsie, in the county of Duchess, in the State of New York, have invented a new and useful apparatus for, and a system of transmitting intelligence between, distant points by means of electro-magnetism, which puts in motion machinery for producing sounds or signs, and recording said signs upon paper or other suitable material; which invention I denominate the American Electro-magnetic Telegraph, and that the following is a full, clear, and exact description of the principle or character thereof, which distinguishes it from all other telegraphs previously known, and of the manner of making and constructing said apparatus, and applying said system, reference being had to the accompanying drawings making part of this specification; in which, examples 1, 2, and 3 show my system of signs, consisting of a combination of dots and spaces, and of dots, spaces, and horizontal lines, intended to represent—example 1, signs for numerals; example 2, signs for compound numerals; example 3, signs for letters; all which signs may also represent words or sentences. Examples 4, 5, and 6 are specimens of the form of type used for regulating the imprinting of the signs. Example 7 is the type rule. Example 8, apparatus for connecting and breaking the electrical or galvanic circuit. Example 10, fig. 1, is a perspective view of the registering apparatus; fig. 2, a top plan; fig. 3, a side elevation of the train of wheels moving the paper and regulating its motion; fig. 4, a sectional elevation of the registering lever and parts appended thereto; fig. 5, alarm apparatus. Example 11 is a diagram showing the relative positions of the different parts of an approved form of apparatus, including a combination of circuits.

Prior to my first application for a patent, it had been essayed to use the currents of electricity or galvanism for telegraphic purposes, either by decomposition, or the action or exercise of the deflective force of a current upon a magnetized bar or needle, which decomposition or deflection required to be noted by ocular inspection at the instant the sign was made. By my invention the intelligence can be transmitted and imprinted on paper, or other suitable substance, without requiring the aid of any person at the station to which the communication is transmitted, so as to be read at any time thereafter.

My apparatus for this purpose consists of two principal parts or combinations. The first part consists of a galvanic battery, or any known generator of galvanism or electricity; a galvanic or electric circuit, composed of any known conductors of electricity; a port rule and signal lever, or other contrivance for closing and breaking the circuit, all in combination with an electro-magnet, or device by which the motive power of the electric or galvanic current, which I call electro-magnetism, may be developed and applied to give motion to the other machin-

ery, for the purpose of marking or imprinting intelligible characters, signs, or letters, at any distance.

The conductors may be suspended in the air, upon posts or otherwise, or buried in the ground, being always well insulated at the posts, or in the ground. This combination is illustrated in the annexed drawings in example 11, fig. 2, where D indicates the battery; a,a, the circuit; E, the port rule; B, the signal lever; and C, the electro-magnet. The new parts, and the operation of this portion of my apparatus, I thus further describe, viz: At any convenient point in the circuit (generally near the generator) a break is made in the conductor, and the two ends thereof are immersed in mercury cups, as shown in the drawings at EE; fig. 1, example 8. To connect the circuit I employ an inverted E, formed [of] a piece of metal, or other proper connector, A, suspended over the mercury cups, EE, on the end of a horizontal lever, denominated in said drawing the signal lever, whose fulcrum is at a, so that when the connector A is dipped into the cups, the circuit is completed. Between the fulcrum and connector A there is affixed to the under side of the lever, and projecting downward, a triangular tooth, b, which bears on the upper surface of the types about to be described, and is raised or lowered by them. The lever may be counterbalanced by a weight, or its equivalent, as at C, to make it move easily.

The types are composed of flat, straight strips of metal, as shown in examples 4 and 5 of the drawings hereunto annexed, having their upper edges indented to suit the character to be represented, and which will be hereinafter more fully set forth in the description of the operation of the machine. The indentations are made of sufficient depth to allow the connector A to be plunged into the mercury cups, and the highest surface raises it from them.

It is obvious that the forms of the upper surface of the type may be reversed, and the cog, b, placed on the other side of the fulcrum, and the same effect would be produced. The types are set up and confined in a rule, to form any required sentences, in one long line; this rule, denominated in the drawing, example 8, a type rule, has, on its under side, a rack that gears into a pinion, x, on a shaft under the grooved railways, D, of common construction, on which said rule slides, and is directed under the cog, b, on the lever; the types are advanced at a regular speed by the application of any convenient power to the pinion, x, and bring the notches, or raised and depressed parts, successively, under the cog b.

The mercury cups may be dispensed with, and any other convenient metallic contact be made to accomplish the same end; and the closing and breaking of the circuit may be effected by applying the hand, or any other machinery, to the signal lever, or by any other mode adapted to the same end. The closing of the circuit by the depression of the signal lever, causes the electric current to run upon the circuit, a,a, ex. 11, fig. 2, and through the helices of the electro-magnet, C, which

is thus charged with power to move any machinery which may be connected with it in a proper manner.

The second part of my invention consists of a register for recording the characters, signs, or letters transmitted from any distance, and is composed of the following parts, in combination, viz., a bent lever, A, as shown most distinctly in example 10, fig. 4; to one arm of this lever there is attached one or more pencils, fountain pens, or other suitable marking instruments, B, directly under which is placed a suitable cylinder, D, over which the paper passes, on which the markings for signs are made.

This cylinder turns on its axis, and is connected by a train of wheels and pinions with a barrel, M, fig. 3, example 10, of common construction, which is driven by a weight and cord wound thereon, and also with a fly, K, of same fig., which regulates its motion; to the other arm of the lever (which is also an armature) is affixed a spiral spring, i, as seen in example 10, figs. 1 and 4.

Near the cylinder D a reel or spool, d, is placed, on which a strip of paper of other markable material is wound, the end of which is carried over the cylinder D, and is confined thereon by means of two tapes and endless bands, or their equivalents, one at each edge, which passes around two pulleys, bb, one on each side of cylinder D. This is clearly represented in figs. 2 and 4, example 10; the clock work is kept at rest by a detent g, in contact with the fly-wheel k, in fig. 3, and connected with the lever as shown in fig. 5.

To the register may be attached an alarm bell, as shown in example 10, fig. 5, the machinery for striking which may be variously modified, and therefore need not be described.

The register, or second part of my invention, is operated upon by the first part in the following manner, viz: The short end of the pen lever in the second part, as seen in example 10, fig. 4, is an armature f, which is brought in proximity to the electro-magnet C, in the circuit aa, as shewn in example 11, fig. 2, and in example 10, fig. 4; the electro-magnet C being charged by closing the circuit, attracts the armature, bringing it nearly in contact, thus imparting a movement to the lever A. By this movement of the lever the detent, fig. 5, example 10, is removed from the fly-wheel, and the clock work begins to move, carrying the paper over the cylinder D, and at the same time the fountain pen, pencil, or other marking instrument is, by the action of the lever, set in motion. The circuit being broken, the lever is brought back to its position by the spiral spring i, and by the closing and breaking of the circuit, more or less rapidly dots, and spaces, and marks of any required lengths are made upon the paper, and in any required combinations.

My system of characters consists of dots, spaces, and lines, variously combined to form letters and other characters, a specimen of which is represented in examples 12 and 3.

To make a dot, a notch, or indentation, is required in the types into which the cog or tooth on the "signal lever" will fall, and instantly

ery, for the purpose of marking or imprinting intelligible characters, signs, or letters, at any distance.

The conductors may be suspended in the air, upon posts or otherwise, or buried in the ground, being always well insulated at the posts, or in the ground. This combination is illustrated in the annexed drawings in example 11, fig. 2, where D indicates the battery; a,a, the circuit; E, the port rule; B, the signal lever; and C, the electro-magnet. The new parts, and the operation of this portion of my apparatus, I thus further describe, viz: At any convenient point in the circuit (generally near the generator) a break is made in the conductor, and the two ends thereof are immersed in mercury cups, as shown in the drawings at EE; fig. 1, example 8. To connect the circuit I employ an inverted E, formed [of] a piece of metal, or other proper connector, A, suspended over the mercury cups, EE, on the end of a horizontal lever, denominated in said drawing the signal lever, whose fulcrum is at a, so that when the connector A is dipped into the cups, the circuit is completed. Between the fulcrum and connector A there is affixed to the under side of the lever, and projecting downward, a triangular tooth, b, which bears on the upper surface of the types about to be described, and is raised or lowered by them. The lever may be counterbalanced by a weight, or its equivalent, as at C, to make it move easily.

The types are composed of flat, straight strips of metal, as shown in examples 4 and 5 of the drawings hereunto annexed, having their upper edges indented to suit the character to be represented, and which will be hereinafter more fully set forth in the description of the operation of the machine. The indentations are made of sufficient depth to allow the connector A to be plunged into the mercury cups, and the highest surface raises it from them.

It is obvious that the forms of the upper surface of the type may be reversed, and the cog, b, placed on the other side of the fulcrum, and the same effect would be produced. The types are set up and confined in a rule, to form any required sentences, in one long line; this rule, denominated in the drawing, example 8, a type rule, has, on its under side, a rack that gears into a pinion, x, on a shaft under the grooved railways, D, of common construction, on which said rule slides, and is directed under the cog, b, on the lever; the types are advanced at a regular speed by the application of any convenient power to the pinion, x, and bring the notches, or raised and depressed parts, successively, under the cog b.

The mercury cups may be dispensed with, and any other convenient metallic contact be made to accomplish the same end; and the closing and breaking of the circuit may be effected by applying the hand, or any other machinery, to the signal lever, or by any other mode adapted to the same end. The closing of the circuit by the depression of the signal lever, causes the electric current to run upon the circuit, a,a, ex. 11, fig. 2, and through the helices of the electro-magnet, C, which

is thus charged with power to move any machinery which may be connected with it in a proper manner.

The second part of my invention consists of a register for recording the characters, signs, or letters transmitted from any distance, and is composed of the following parts, in combination, viz., a bent lever, A, as shown most distinctly in example 10, fig. 4; to one arm of this lever there is attached one or more pencils, fountain pens, or other suitable marking instruments, B, directly under which is placed a suitable cylinder, D, over which the paper passes, on which the markings for signs are made.

This cylinder turns on its axis, and is connected by a train of wheels and pinions with a barrel, M, fig. 3, example 10, of common construction, which is driven by a weight and cord wound thereon, and also with a fly, K, of same fig., which regulates its motion; to the other arm of the lever (which is also an armature) is affixed a spiral spring, i, as seen in example 10, figs. 1 and 4.

Near the cylinder D a reel or spool, d, is placed, on which a strip of paper of other markable material is wound, the end of which is carried over the cylinder D, and is confined thereon by means of two tapes and endless bands, or their equivalents, one at each edge, which passes around two pulleys, bb, one on each side of cylinder D. This is clearly represented in figs. 2 and 4, example 10; the clock work is kept at rest by a detent g, in contact with the fly-wheel k, in fig. 3, and connected with the lever as shown in fig. 5.

To the register may be attached an alarm bell, as shown in example 10, fig. 5, the machinery for striking which may be variously modified, and therefore need not be described.

The register, or second part of my invention, is operated upon by the first part in the following manner, viz: The short end of the pen lever in the second part, as seen in example 10, fig. 4, is an armature f, which is brought in proximity to the electro-magnet C, in the circuit aa, as shewn in example 11, fig. 2, and in example 10, fig. 4; the electro-magnet C being charged by closing the circuit, attracts the armature, bringing it nearly in contact, thus imparting a movement to the lever A. By this movement of the lever the detent, fig. 5, example 10, is removed from the fly-wheel, and the clock work begins to move, carrying the paper over the cylinder D, and at the same time the fountain pen, pencil, or other marking instrument is, by the action of the lever, set in motion. The circuit being broken, the lever is brought back to its position by the spiral spring i, and by the closing and breaking of the circuit, more or less rapidly dots, and spaces, and marks of any required lengths are made upon the paper, and in any required combinations.

My system of characters consists of dots, spaces, and lines, variously combined to form letters and other characters, a specimen of which is represented in examples 12 and 3.

To make a dot, a notch, or indentation, is required in the types into which the cog or tooth on the "signal lever" will fall, and instantly

rise from, as the types move onward; and when a line is to be formed on the paper at the register, as a sign the notch in the type is extended, so that the lever will remain down for a space of time sufficient to make the line required. The alarm bell shown at A, example 10, fig. 5, may be struck by means of a hammer actuated by a supplementary electro-magnet placed in the same circuit as that first named. Any convenient number of registers and registering stations may be connected with the same circuit, all constructed and operating as above described.

To extend more effectually the communication by my apparatus, I adopt the following arrangement whereby I can use any number of additional batteries, or generators of electricity, and by which I can connect progressively any number of consecutive circuits, viz: I place at any point in the first circuit an electro-magnet, and opposite its poles I place an armature on a lever like that described for registering, but instead of using the said lever to mark with, I use it to close and break a second circuit, precisely as the signal lever is used to close and break the first circuit. The second circuit has an independent battery, and may be used to work a register or other apparatus for registering, or to close and break a third circuit, or both; and thus, by a combination of circuits, the requisite power can be obtained at any distances ad infinitum; this combination is shown in example 11, fig. 1.

It will be observed that my vocabulary, system of signs, or secret writing by cypher, can be conveniently used in communicating by this telegraph, and any mode of closing and breaking a circuit may be adopted, the object being to do so at proper intervals.

Claims.

First. Having thus fully described my invention, I wish it to be understood that I do not claim the use of the galvanic current or currents of electricity for the purpose of telegraphic communications generally; but what I specially claim as my invention and improvement, is making use of the motive power of magnetism, when developed by the action of such current or currents substantially as set forth in the foregoing description of the first principal part of my invention, as means of operating or giving motion to machinery which may be used to imprint signals upon paper or other suitable material, or to produce sounds in any desired manner for the purpose of telegraphic communication at any distances. The only ways in which the galvanic current had been proposed to be used prior to my invention and improvement, were by bubbles resulting from decomposition, and the action or exercise of electrical power upon a magnetized bar or needle; and the bubbles and the deflections of the needles thus produced, were the subjects of inspection, and had no power or were not applied to record the communication. I therefore characterize my invention as the first recording or printing telegraph by means of electro-magnetism.

There are various known modes of producing motions by electro-

magnetism, but none of these had been applied prior to my invention and improvement to actuate or give motion to printing or recording machinery, which is the chief point of my invention and improvement.

Second. I also claim as my invention and improvement the employment of the machinery called the register or recording instrument, composed of the train of clock wheels, cylinders, and other apparatus, or their equivalents, for moving the material upon which the characters are to be imprinted, and for imprinting said characters substantially as set forth in the foregoing description of the second principal part of my invention.

Third. I also claim as my invention and improvement the combination of machinery herein described, consisting of the generator of electricity, the circuit of conductors, the contrivance for closing and breaking the circuit, the electro-magnet, the pen, or contrivance for marking, and the machinery for sustaining and moving the paper all together, constituting one apparatus or telegraphic machine, which I denominate the American Electro-magnetic Telegraph.

Fourth. I also claim as my invention the combination of two or more galvanic or electric circuits, with independent batteries, substantially by the means herein described, for the purpose of obviating the diminished force of electro-magnetism in long circuits, and enabling me to command sufficient power to put in motion registering or recording machinery at any distance.

Fifth. I claim as my invention the system of signs consisting of dots and spaces, and of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated for telegraphic purposes.

Sixth. I also claim as my invention the system of signs, consisting of dots and spaces, and of dots, spaces, and horizontal lines, substantially as herein set forth and illustrated, in combination with machinery for recording them as signals for telegraphic purposes.

Seventh. I also claim as my invention the types or their equivalent, and the type rule and port rule, in combination with the signal lever or its equivalent as herein described, for the purpose of closing and breaking the circuit of galvanic and electric conductors.

Eighth. I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing specification and claims, the essence of my invention being the use of the motive power of the electric or galvanic current, which I call electro-magnetism, however developed, for marking or printing intelligible characters, signs, or letters at any distances, being a new application of that power, of which I claim to be the first inventor or discoverer.

SAMUEL F. B. MORSE.

Witnesses—GEORGE WOOD,
J. READ BAILEY.

The second patent to Samuel F. B. Morse, dated 13th June, 1848, is as follows, to wit:

Second patent to Morse, 13th June, 1848.

The United States Patent office, to all to whom these presents shall come, greeting:

This is to certify, that the annexed is a true copy from the records of this office.

In testimony whereof, I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this seventeenth day of June, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-second.

[L. S.]

EDMUND BURKE.

No. 118.

The United States of America, to all to whom these letters patent shall come:

Whereas Samuel F. B. Morse, [of] Poughkeepsie, New York, has alleged that he has invented a new and useful improvement in electro-magnetic telegraphs, for which letters patent were granted on the 11th day of April, 1846, which letters patent are hereby cancelled on account of a defective specification, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original or first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Samuel F. B. Morse, his heirs, administrators, or assigns, for the term of fourteen years, from the eleventh day of April, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Samuel F. B. Morse in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent office has been hereunto affixed.

[L. S.]

Given under my hand at the city of Washington, this thirteenth day of June, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States of America the seventy-second.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent office.

EDMUND BURKE,
Commissioner of Patents.

Examined. J. J. R.

Schedule.

The schedule referred to in these letters patent, and making part of the same.

Be it known that I, Samuel F. B. Morse, now of Po'keepsie, in Duchess county, in the State of New York, have invented a new and useful improvement in the electro-magnetic telegraph; and I do hereby declare that the following is a full, clear, and exact description of the object, construction, and operation thereof, reference being had to the accompanying drawings, and making part of the same.

Object of the invention.

The original and final object of all telegraphing is the communication of intelligence at a distance by signs or signals.

Various modes of telegraphing, or making signs or signals at a distance, have for ages been in use. The signs employed heretofore have had one quality in common. They are evanescent, shown or heard a moment, and leaving no trace of their having existed. The various modes of these evanescent signs have been by beacon fires of different characters, by flags, by balls, by reports of fire arms, by bells heard from a distant position, by moveable arms from posts, &c.

I do not, therefore, claim to be the inventor of telegraphs generally. The electric telegraph is a more recent kind of telegraph, proposed within the last century, but no practical plan was devised until about sixteen years ago. Its distinguishing feature is the employment of electricity to effect the same general result of communicating intelligence at a distance by signs or signals.

The various modes of accomplishing this end by electricity, have been the employment of common or machine electricity, as early as 1787, to show an evanescent sign by the divergence of pith balls. The employment of common or machine electricity, in 1794, to show an evanescent sign by the electric spark. The employment of voltaic electricity, in 1809, to show an evanescent sign by the evolution of gas bubbles, decomposed from a solution in a vessel of transparent glass. The employment of voltaic electricity in the production of temporary magnetism, in 1820, to show an evanescent sign by deflecting a magnet or compass needle.

The result contemplated from all these electric telegraphs was the production of evanescent signs or signals only.

I do not, therefore, claim to have first applied electricity to telegraphing for the purpose of showing evanescent signs or signals.

The original and final object of my telegraph is to imprint characters,

at any distance, as signals for intelligence; its object is to mark or impress them in a permanent manner.

To attain this end, I have applied electricity in two distinct ways: 1st. I have applied, by a novel process, the motive power of electro-magnetism, or magnetism produced by electricity, to operate machinery for printing signals at any distance. 2d. I have applied the chemical effects of electricity to print signals at any distance.

The apparatus or machine with which I mark or imprint signs or letters for telegraphic purposes at a distance, I thus describe, viz:

1st. The machinery at the transmitting terminus. 2d. The machinery at the receiving or recording terminus. 3d. The arrangement of circuits or conductors, consisting of the main circuit and local circuit or circuits, connecting the machinery of both termini.

1st. The machinery at the transmitting terminus consists of the key or correspondent N. See sheet III, fig. 6. The part N is of wood or some convenient non-[con]ducting substance; 3 is a spring or lever of metal, fastened upon N at one end, and terminating at the other in a knob or hammer, t, faced with platinum; U is a metallic anvil, also faced with platinum. Parts of the electric conductor terminate at the key, the one part at the anvil U, and the other at the hammer t, in such a way that the only part broken of the entire circuit is between the points U and t. The object of the key is to close and break the circuit.

2d. The machinery at the receiving terminus consists of the receiving magnet. See fig. 4, sheet II. H H are the coils or helices of the magnet, being part of the main circuit of conductors. K K, see figs. 4 and 5, sheet II and III, represent the iron of the electro-magnet in a form to enable me to enlarge the coils or helices without separating to an inconvenient distance the poles L L from each other. K K represent the upper and lower portions of the magnet, which are without the coils, and one of which unites the two portions of the magnet within the coils, forming one piece with them; the other bar is united at one end to this piece by a screw at r, and runs divergent from the position of the other bar in such a manner as to bring the two poles, L L, near each other, but not in contact. This arrangement admits of coils of any desired size to form the helices of a magnet, without requiring any increase in the size of the armature, thus allowing to the armature a quicker vibration and a more delicate adjustment. The special object of the receiving magnet is to close and break, at a distance, another circuit called a local circuit; in which local circuit is a magnet and battery, or their equivalents, for the production of the power necessary to mark or imprint characters. S is the armature of the receiving magnet, affixed to the metallic lever T, supported by the metal standard P, which is attached to a wooden frame or other non-conducting substance, M. j is a spring, so attached to the lever T as to withdraw the armature S from the poles L L of the magnet, when the magnetic force is withdrawn; the other extremity of the spring being so attached to a thumbscrew, q, as to be adjusted to any desired degree of strength

or delicacy. I is a stop (being a screw with a head) to regulate, in connexion with another metallic screw, y, the limits of motion of the lever T. The screw y has its end, W, faced with platinum, in order to form better contact with the platinum point or surface, V, on the lever T. On the proper adjustment of these two screws, I and y, depends the efficiency of the receiving magnet. The limits of motion should be such that, when the magnet is charged, the point V should come in contact with the point W, but the surface of the armature should not touch the surface of the poles of the magnet; and, when the magnet is not charged, the armature should not be withdrawn by the spring j beyond the sphere of the magnet's attraction.

The register consists of a series of wheels and pinions, and its object is to regulate the movement of paper or other material upon which to imprint telegraphic characters.

A, A, &c.; sheet III; figs. 1 and 3. The platform of wood, or other convenient material, upon which the machinery is erected.

B, B, &c. The standards for the reel of paper; and C, the reel of paper upon which is to be imprinted the telegraphic characters.

D, one form of the arrangement of the wheels and pinions of the register.

d, e. Rollers for drawing the paper in contact with the pen, or marking roller, 2; seen also on sheet III, fig 10.

Sheet II, fig. 3, E. The helices, or coils and magnet of the register.

F, the pen, lever, and armature of the magnet attached. 5, 6, are stops, being thumbscrews attached to some convenient fixed part of the machinery for limiting the motion of lever F; to which is affixed both the armature of the magnet E, and the pen point or points, g. The stop, 5, arrests the movement of the armature as it moves towards, and stops, 6, as it recedes from (by the action of the spring, 7,) the poles of the magnet, according as magnetism exists or ceases. The spring, 7, so operates on the lever, F, as to be antagonistic to the attractive power of the electro-magnet, E. Not so strong as successfully to resist the magnetic power when excited, but strong enough when the magnetic power ceases to bring the armature back quickly. The armature, in its movements, should not be allowed to touch the face of the magnet; nor should the point or points, g, (of which there may be one or more, at pleasure,) be allowed to touch the bottom of the groove or grooves of the roller, 2. The pen point or points, if they are screws, aid in an exact adjustment of the pen lever.

The frame, D, contains the train of wheels whose motion is caused by the weight, a, or its equivalent.

Connected with the train of wheels is the self-stopping apparatus, G G, which consists of a friction wheel or brake wheel, i i, of any suitable material, as wood, cork, &c., which should be fixed upon any convenient part of the fly-wheel shaft, u, the swiftest, or one of the swiftest, in the train. Another shaft, G, has at one extremity a pulley wheel, connected by a small cord with another pulley wheel, G', fixed upon the shaft of the barrel, b. The diameter of the pulley wheel, G,

is greater than that of G'; attached to and forming a part of the shaft of G, is a small arm or brake, K, of metal, or other suitable material, so formed as to come in contact with the friction wheel, i i. A light rod of wire, m, secured at one extremity to, and dropped from, the pen lever, F, has the other extremity with a screw-thread cut upon it, which rod passes freely through an opening in the brake, k. A nut, fitting the screw, keeps the rod from passing back through the opening, and at the same time serves to adjust and regulate the movement of the brake.

The object of the self-stopping apparatus is to enable the operator to put in action or to arrest at pleasure the movements of the distant register.

The paper rollers, d e, and 2, fig. 10, sheet III, are so connected with the train of wheels, that the paper drawn from the reels by passing between d and e, is made to be in contact with the grooved cylinder, 2. The roller, e, is kept in contact with d, by the forked spring in fig. 10 bearing upon the ends of the journals, and regulated in its length by the thumbscrews, 8 and 9. The bearing or sockets for the ends of the shafts of e are not circular, but are slats, to allow of a slight movement in a direction with and against the face of the spring, so that the spring shall act with proper power, tending to keep the cylinder, e, in contact with d.

The circuits of conductors.

A circuit is a continuous connexion by a good conductor between and uniting the two poles of a battery, or any generator of electricity.

I use in my arrangement for imprinting signals two combinations of circuits in connexion with the receiving magnet or its equivalent.

The first combination consists of two or more single circuits consecutively arranged, each having a battery and receiving magnet, or their equivalents; the second circuit being dependent on the first circuit, and the third on the second, and the fourth on the third, and so on, ad infinitum, like links of a chain. In this combination of circuits the entire line is dependent on the entirety of each single circuit of the whole series.

The second combination consists of one main single circuit, containing in it any number of receiving magnets, or their equivalents, the helices of which are successively and continuously connected. Each receiving magnet, or its equivalent, closes and breaks an independent second circuit, which is no part of the main line, nor is the main line influenced in its action by the derangement of any one or all of the local or secondary circuits. Both combinations of circuits may be insulated upon posts, or otherwise, to any distances throughout a country.

These two combinations of circuits are illustrated by figs. 8 and 9, sheet IV.

Example 1*st.*

The first link has a battery, G; from the pole P, the circuit connects the anvil D of a key or correspondent, where it terminates. From E it again commences, and passing through F, continues to the plate C in the earth; thence through the earth to plate B, and through the helices of the magnet A, terminating at the other pole, N, of the battery. At the key F E D is the only part of the circuit broken, to wit, between E and D. When E is pressed down so as to touch D, the circuit is closed, and the magnetic influence from the battery G, operating on A, the lever F′ E′ D′ of the second link is brought down, D′ and E′ are connected (the only broken part of the second circuit similarly arranged as the first,) and the battery G′ operates the helices of the magnet A′, connected with another lever, and so on to a third link indefinitely.

Example 2nd, fig. 9.

From one pole of the main battery M, the conductor proceeds to the key P, where it is interrupted, (as in the key F E D of the previous example,) and thence proceeds to the plate K in the earth, passing through the earth to the plate L, at the other terminus. From L it passes to a similar key R, thence through the helices of receiving magnet O, to an intermediate key Q, thence through the helices of receiving magnet N, and so completing the circuit at the other pole of the battery M. The local circuits are without the main line. When not in use, the keys P, Q, and R are kept closed, so that wherever there is a key upon the line, an operator can command the whole line by breaking and closing circuit with the key at his station. Each key operates every receiving magnet on the line. N and O both operate, when either of the keys P, Q, or R is made to close, and break the circuit. When the main circuit is closed, the magnetism at N and O operates the local lever or key which connects the local circuit, having the local battery S, and the register magnet T, in the local circuit, causing the lever operated by T to mark the characters on the paper at U.

In the example 1st, the receiving magnet propagates the magnetic impulse from circuit to circuit, on consecutive and mutually dependent circuits; in example 2d it is propagated from a main circuit simultaneously to independent circuits.

Connexion of the other parts of the machinery with the circuits.

O, sheet II, fig. 3, is the main battery, from one pole of which the main conductor N proceeds to the plate Q′ in the earth; from thence it passes in the direction of the arrow to the plate Q; thence to the key N, where it terminates at t. Commencing again at u, it proceeds to the helices of the magnet K K, and back to the other pole of the battery O.

R is the local battery from one pole, of which the conductor X X X of the local circuit proceeds to the screw y, and to the point W, where

it terminates. Commencing at V, on the lever T, it passes through the metal standard P to the screw z; from thence through the helices of the register magnet E, and thence back to the other pole of the battery R.

Having thus described the object and construction of my invention, and the connexion of the different parts of the machinery with each other, I will now describe the operation of the system combined as a whole.

The register D is at rest, and the weight prevented from acting and moving the clock work by the pressure or friction of the brake K upon the brake wheel i, the brake being kept in contact with the brake wheel by the power of the weight itself. Now, when the key or correspondent N is pressed down, so that the metallic hammer t shall strike the anvil w, this being the only part of the main current that is interrupted or broken, the circuit of conductors from the two poles of the main battery O, are by this act connected, and the electricity from the battery freely passes through the entire circuit n, n, n, imparting magnetic power to the helices H H of the receiving magnet K K. The armature S, on the metallic lever T, is now attracted by the poles L L and V W, the only parts of the local circuit broken are brought together, closing the local circuit X X X of the local battery R, which instantly imparts magnetic power to the register magnet E to strike the point or pen g against the paper. The rising of the lever F has suddenly raised the brake K, by means of the rod m, from the brake wheel i, so that now the weight a is permitted to move the whole train. The rollers d e commence drawing the paper in regular time from the paper reel C. If the key which has been pressed down is now released, and the circuit broken, the lever F falls, the power being gone that held it. But when it falls, the lower end of the brake rod having free play through the opening in the brake lever, does not in its descent take down the brake, but leaves it to the slow action of the clock work gradually to bring it down into contact again with the brake wheel. While closing and breaking the circuit, therefore, for imprinting the characters, the machine keeps in movement, for every rising of the lever F in the act of writing or imprinting prevents the brake lever from descending, and coming in contact with the brake wheel, for the cord which connects G with G′ slips upon the smallest wheel G′ from the quickness of the action of the lever; but when the circuit remains broken for a short time, the lever F having fallen, there is now no more obstacle to the break lever k m slowly descending by the action of the machinery, till it comes in contact with the brake wheel i, and thus arrests all motion.

In this manner, by the apparatus, or machine, or combination of machinery above described, I am enabled, standing at any one station, to mark or imprint signs or signals at any other station however distant; and by a combination of these machines, by means of electro-magnetism, all being in order, I can at the same instant, by pressure upon one key, mark or imprint the same signs or signals at any number of

points throughout the American continent. This machinery I call the American Electro-magnetic Telegraph.

Claims.

First. What I claim as my invention, and desire to secure by letters patent, is the employment, in a main telegraphic circuit, of a device or contrivance called the receiving magnet, in combination with a short local independent circuit or circuits, each having a register and register magnet, or other magnetic contrivances, for registering and sustaining such a relation to the register magnet, or other magnetic contrivances for registering, and to the length of circuit of telegraphic line as will enable me to obtain, with the aid of a main galvanic battery and circuit, and the intervention of a local battery and local circuit, such motion or power for registering as could not be obtained otherwise without the use of a much larger galvanic battery, if at all.

Second. I also claim, as my invention, the combination of the apparatus called the self-stopping apparatus, connected with the clock work of the register, for setting said register in action, and stopping it with the pen lever F, as herein described.

Third. I also claim, as my invention, the combination of the point or points of the pen and pen lever, or its equivalent, with the grooved roller, or other equivalent device over which the paper or other material suitable for marking upon may be made to pass for the purpose of receiving the impression of the characters, by which means I am enabled to mark or print signs or signals upon paper, or other fabric, by indentation; thus dispensing with the use of coloring matter for marking, as specified in my letters patent of January 15th, 1846.

SAMUEL F. B. MORSE.

Witnesses—
GEO. WOOD,
J. THOMAS CLARK.

The assignment from Case, Wright, &c., to F. O. J. Smith is as follows, to wit:

Assignment—Case, Wright, &c., to F. O. J. Smith.

The United States Patent office, to all to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office.

In testimony whereof, I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed this twenty-fifth day of March, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-second.

[L. S.]

EDMUND BURKE.

Whereas Eliphalet Case, jr., by deed, dated the 16th day of Jan-

uary, 1847, executed by him and John C. Wright, Lewis Worthington, George S. Coe, and Abel C. Thomas, conveyed to them to hold with him, in trust for the Western Telegraph company, the right to construct and use Morse's Electro-magnetic Telegraph on certain lines of communication, therein fully expressed, under a power contained in a deed of trust of the same right from Samuel F. B. Morse, Alfred Vail, Leonard D. Gale, by their attorney in fact, Amos Kendall, and by F. O. J. Smith, as grantors, and by said Eliphalet Case, jr., as grantee, and dated the 21st day of December, 1846. And whereas the parties in interest are now desirous of closing said trust, and of fully concelling the same: Now, therefore, these presents witness, that for and in consideration of the premises, and of one dollar to us in hand paid, the receipt of which is hereby acknowledged, we, the above named Wright, Worthington, Coe, Case, and Thomas, hereby grant, assign, release, and convey the said right, in us vested, to construct and use said telegraph to the said Francis O. J. Smith, as fully and entirely as the same is now held by us, and fully and absolutely cancel said deed of trust respectively.

In testimony whereof we have hereto set our hands and seals, this 10th day of December, A. D. 1847.

ELIPHALET CASE, Jr., [SEAL.]
J. C. WRIGHT, [SEAL.]
L. WORTHINGTON, [SEAL.]
GEORGE S. COE, [SEAL.]
By his attorney, JOHN C. WRIGHT,
ABEL C. THOMAS, [SEAL.]
By his attorney, J. C. WRIGHT.

Signed, sealed, and delivered in our presence—
TIMOTHY WORTHINGTON, as to the signature of E. Case.

(Received and recorded 24th March, 1848.)

Whereas, Eliphalet Case, jr., John C. Wright, Lewis Worthington, Abel C. Thomas, and myself, by virtue of a deed of trust, dated the 16th day of January, 1847, executed by us, hold in trust the right to construct and use Morse's Electro-magnetic Telegraph on certain lines in said deed more fully described. And whereas it is now desired to release and reconvey said trust, I here constitute and appoint John C. Wright and L. Worthington, or either of them, my attorney to execute for me, and in my name, any such deed of release or reconveyance as they may deem expedient, hereby confirming their or either of their acts in the premises, to have the same effect as if executed by me personally.

Witness my hand and seal this eighteenth day of December, 1847.

GEO. S. COE. [L. S.]

Witness: JNO. S. MICKLE.

(Received and recorded 24th March, 1848.)

Whereas, by deed, executed the 16th of January, 1847, executed by Eliphalet Case, John C. Wright, L. Worthington, George S. Coe, and myself, the parties to said deed, became invested with the right to construct and use Morse's Electro-magnetic Telegraph on certain lines therein fully described; and whereas it is now desired by the parties holding said interest to reconvey and release the said trust, therefore I do hereby authorize and empower John C. Wright and Lewis Worthington, or either one of them, for me, and in my name, to execute and deliver such deed of release, or reconveyance of said trust, as they, or either of them, may assent to, and I do hereby ratify and confirm their or either of their acts in the premises, to have the same effect as if executed by myself.

Witness my hand and seal this 20th day of December, 1847.

ABEL C. THOMAS. [L. S.]

Witness—

M. ISAACS.

Received and recorded 24th March, 1848.

The assignment from F. O. J. Smith to Morse and Vail is as follows, to wit:

Assignment—F. O. J. Smith to Morse and Vail.

The United States' Patent office, to all to whom these presents shall come, greeting:

This is to certify, that the annexed is a true copy from the records of this office of an assignment of Francis O. J. Smith to Samuel F. B. Morse, dated 25th March, 1848.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this [L. S.] twenty-fourth day of April, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-second.

EDMUND BURKE.

Know all men by these presents, that for a valuable consideration to me in hand paid, the receipt whereof I do hereby acknowledge, do hereby relinquish, make over, and convey to Samuel F. B. Morse, his heirs and assigns, ten sixteenth parts, and to Alfred Vail, his heirs and assigns, two sixteenth parts of all the right, title and interest, derived to me in and to the use of said Morse's letters patent for the electro-magnetic telegraph, by the deed of John C. Wright and others, as trustees, in all territory south of Cincinnati, and the line of telegraph constructed by Henry O'Rielly and others from Pittsburg to Cincinnati, and in territory through which the New Orleans and Ohio telegraph company have located, or propose to locate, and construct a line of telegraph under said Morse's patents.

In testimony whereof I have hereunto set my hand and seal, on this 25th day of March, A. D. 1848.

FRANCIS O. J. SMITH. [L. S.]

In presence of—
L. L. SADLER,
EDWARD B. CHILD.

The contract between Samuel F. B. Morse, &c., and Henry O'Rielly, is as follows, to wit:

Contract—Morse, &c., and H. O'Rielly.

Articles of agreement for extending the electro-magnetic telegraph from the seaboard to the Mississippi and the Lakes.

This memorandum of an agreement between Henry O'Rielly, of the one part, and Samuel F. B. Morse, Leonard D. Gale, Alfred Vail, and Francis O. J. Smith, of the second part, witnesseth as follows:

That the said Henry O'Rielly undertakes on his part, at his own expense, to use his best endeavors to raise capital for the construction of a line of Morse's Electro-magnetic Telegraph, to connect the great seaboard line at Philadelphia, or at such other convenient point on said line as may approach nearer to Harrisburg, in Pennsylvania, and from thence, through Harrisburg and other intermediate towns, to Pittsburg; and thence through Wheeling and Cincinnati, and such other towns and cities as the said O'Rielly and his associates may elect, to St. Louis, and also to the principal towns on the lakes.

In consideration whereof the said parties of the second part agree and bind themselves, their representatives and assigns, that when the said O'Rielly shall have procured a fund sufficient to build a line of one wire from the connecting point aforesaid to Harrisburg, or any point further west, to convey the patent right to said line so covered by capital, in trust for themselves and the said O'Rielly and his associates, on the terms and conditions set forth in the articles of agreement and association, constituting the "Magnetic Telegraph company," and providing for the government thereof, with the following alterations, viz: The amount of stock or other interest in the lines to be constructed, reserved to the grantors and assigns, shall be one-fourth part only, and not one-half of the whole, on so much capital as shall be required to construct a line of two wires; but in all cases of a third wire, or any greater number, the stock issued on the capital employed for such additional wire or wires, shall be divided equally between the subscribers of such capital and the grantors of the patent right, or their assigns. No preference is to be given to the party of the first part and his associates in the construction of connecting lines; nor shall any thing herein be construed to prevent an extension, by the parties of the second part, of a line from Buffalo to connect with the lake towns at Erie, nor to prevent the construction of a line from New Orleans to connect the western towns directly with that city; but such lines shall not be used to connect any western cities or towns with each other, which may have already been connected by said O'Rielly.

In case of a sale of the entire patent right to the Government, the grantors shall be bound to pay the actual reasonable cost of the lines constructed under this agreement, with twenty per cent. thereon, and no more, to vest the Government with the entire ownership of such lines: provided, as specified in the articles of agreement of the "Magnetic Telegraph company," the purchase be made or provided for by Congress before the 4th of March, 1847.

The tariff of charges on the lines so constructed shall conform substantially to the tariff of charges on the great seaboard line before named, and in no case to be so arranged as to render the lines unequal in this respect, to the prejudice of either. Unless the line from the point of connexion with the seaboard route shall be constructed within six months from date to Harrisburg, and capital provided for its extension to Pittsburg, within said time, then this agreement and any conveyance in trust that may have been made in pursuance thereof, shall be null and void thereafter, unless it shall satisfactorily appear that unforeseen difficulties are experienced by said O'Rielly and his associates, in obtaining from the State officers of Pennsylvania the right of way along the public work; and in that event the conditional annulment aforesaid shall take effect at the end of six months after such permission shall be given or refused. And any section beyond said last point, embraced within the provisions of this agreement, which shall not be constructed by said O'Rielly and his associates within six months after said parties of the second part shall request said O'Rielly to cause said lines to be constructed, so as to extend the connexion at least one hundred and fifty miles beyound said last point, and in like ratio during each succeeding six months thereafter, then in relation to all such sections of the line, this agreement shall be null and void, provided that such request shall not be made prior to the 1st of April next, (1846.) And the party of the second part shall convey said patent right on any line beyound Pittsburg, to any point of commercial magnitude, when the necessary capital for the construction of the same shall have been subscribed within the period contemplated by this agreement, by responsible persons, and not otherwise.

Contract—Morse, &., and O'Rielly.

Done at the city of New York, this 13th day of June, in the year of our Lord eighteen hundred and forty-five.

(Signed) HENRY O'RIELLY,
FRANCIS O. J. SMITH,
SAM. F. B. MORSE.
L. D. GALE, by his
Attorney, S. F. B. MORSE.

UNITED STATES OF AMERICA,
Southern District of New York.

Francis O. J. Smith makes oath before the undersigned, that the

foregoing four pages and a half contains a true copy of a contract between Henry O'Rielly, S. F. B. Morse, and others, dated June 13th, 1845, and that his duplicate original of said contract is in the hands of Mr. Seward, his counsel, in the northern district of New York. Deponent writes his name on each page.

GEO. W. MORTON, *U. S. Com.*

UNITED STATES OF AMERICA,
Southern district of New York, ss.

I, Alexander Gardiner, clerk of the circuit court of the United States of America, for the southern district of New York, second circuit, do hereby certify, that I am well acquainted with the handwriting of George W. Morton, whose name is subscribed to the annexed deposition, and that the signature to the same is in his proper handwriting. And I do further certify that he was at the time of signing the same a commissioner duly appointed by the circuit court of the United States of America, for the southern district of New York, second circuit, under and by virtue of the acts of Congress, in such case made and provided.

In testimony whereof, I have hereunto subscribed my name and affixed the seal of the said circuit court, this eighth day of August, [L. S.] in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-third.

The following is the letter from Henry O'Rielly to F. O. J. Smith, to wit:

Letter from H. O'Rielly to F. O. J. Smith.

LANCASTER, *Oct.* 24, 1846.

Hon. F. O. J. SMITH.

DR. SIR: After thorough re-examination of the contract and of the testimony in our possession, neither my associates nor myself are able to perceive that there is any forfeiture on our part. It is proper to observe that these associates include several lawyers, four of whom are among the prominent counsellors in the State of New York; and "the law and the testimony," as well as the contract, and the rights acquired by them and others under that contract, have been most carefully considered; considered not now merely, but steadily kept in view from the commencement to the end, that everything which the spirit as well as the letter of the contract contemplated might be faithfully discharged.

Setting aside any consideration of my own efforts, I may say that my associates are generally men who neither rashly embark nor readily abandon an enterprize, being always careful to know that the progress of their efforts, as well as the origin and objects of those efforts, are in accordance with justice and honor. In their hands, sustained by their talent, character, and property, the rights and duties under my contract, (which is their contract also,) have been and will be most sedulously considered, for they esteem that contract quite as sacred as the patent,

and will unite with the patentees in maintaining both with equal energy whenever either may be assailed in any form or place. It will not be their fault if the faith and honor and justice which should characterize the telegraph system in its aspirations for public confidence are violated or assailed.

Yours, respectfully,
HENRY O'RIELLY.

A true copy—B. B. FRENCH.

UNITED STATES OF AMERICA,
Southern district of New York, ss:

Personally appeared on this eighth day of August, 1848, before me, the undersigned, George W. Morton, one of the commissioners appointed by the circuit court of the United States, for the southern district of New York, Benjamin B. French, who is known to me, who being duly sworn according to law on the holy evangelist of Almighty God, doth depose and say, that he knows Henry O'Reilly, and is well acquainted with his handwriting, having seen him write. That there is now before him, produced by F. O. J. Smith, an original letter of said O'Rielly to said Smith, dated "Lancaster, Oct. 24, 1846." That deponent has carefully examined said letter; that it is in the handwriting of said O'Rielly; and that on the opposite page is a true and perfect copy of the same, having been compared by deponent; and that deponent has in presence of the undersigned written the words "a true copy," and his signature at the foot of said copy, and also his signature at the foot of this certificate. And at the same time personally appeared before me, the undersigned, Francis O. J. Smith, who is known to me, and being duly sworn on the holy evangelist of Almighty God, doth depose and say, that he has the original letter of Henry O'Reilly to him, dated Lancaster, Oct. 24, 1846, of which a copy is on the first page of this sheet. That he retains the same in his possession for the purpose of using it in a suit, in the northern district of New York, against said O'Rielly and others, which will be heard shortly; and that he is advised by his counsel that it is necessary to have said original letter at the hearing, and that otherwise deponent would send the same to be produced before the judge of the United States, for the district of Kentucky, on the motion to be made before him for an injunction against the said O'Reilly and others; and said deponent subscribes his name at the foot of this certificate.

In testimony whereof I have hereunto subscribed my name this eighth day of August, A. D. 1848. GEO. W. MORTON,
U. S. Commissioner.

B. B. FRENCH,
FRANCIS O. J. SMITH.

UNITED STATES OF AMERICA,
Southern district of New York, ss.

I, Alexander Gardiner, clerk of the circuit court of the United States

of America, for the southern district of New York, second circuit, do hereby certify, that I am well acquainted with the handwriting of George W. Morton, whose name is subscribed to the annexed deposition, and that the signature to the same is in his proper handwriting. And I do further certify, that he was at the time of signing the same a commissioner duly appointed by the circuit court of the United States of America, for the southern district of New York, second circuit, under and by virtue of the acts of Congress in such case made and provided.

In testimony whereof I have hereunto subscribed my name and affixed the seal of the said circuit court, this eighth day of August, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of these United States the seventy-third.

[L. S.]

ALEX'R GARDINER.

The assignment from Morse, Smith, Vail, &c., to E. Case, &c., is as follows, to wit:

Assignment—Morse, &c., to Case, &c.

The United States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify, that the annexed are true copies from the records of this office, of the assignment of Morse, Gale, Vail, and Smith to E. Case, and Wright et al. to F. O. J. Smith.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this fifth day of August, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of the United States the seventy-third.

[L. S.]

EDMUND BURKE.

Whereas we, Samuel F. B. Morse, Alfred Vail, Leonard D. Gale, and Francis O. J. Smith, are seised and possessed of the exclusive right to construct and use Morse's Electro-magnetic Telegraph, on the lines of communication hereafter named, to wit: From the city of Cincinnati to intersect at some point with the Erie and Michigan Telegraph Compony, on the shore of Lake Erie; from Cincinnati to St. Louis, in Missouri; from Cincinnati to New Orleans, by Louisville and Nashville; from Cincinnati, by Wheeling, to Pittsburg; from Pittsburg, through Harrisburg, to Philadelphia; and from Pittsburg and Wheeling to the cities of Baltimore and Washington, as defined by the patent of said Morse, issued under the laws of the United States, on the twentieth day of June, 1840, and renewed on the fifteenth day of January, 1846; and his additional patent granted on the eleventh day of April, A. D. 1846. And whereas Eliphalet Case, junior, of the city of Cincinnati, in the State of Ohio, is desirous, with associates, to construct and use said telegraph on said lines, under the name of the Western Tele-

grah Company, and to consummate said construction articles of agreement and association have been formed and signed concurrently with these premises, by and between said Morse, Gale, Vail, and Smith, the three former by their attorney, and the latter in his own right, and said Case.

Now, therefore, this indenture witnesseth, that for and in consideration of the provisions of said articles of agreement and association, we, the said Morse, Vail, and Gale, by our attorney in fact, Amos Kendall, and said Smith in his own right, have bargained, sold, and made over, and hereby do bargain, sell, assign, and make over, to said Case, as and in the capacity of trustee only, pursuant to and for the purpose named in certain articles of agreement and association hereinbefore named, constituting the Western Telegraph Company, and signed by each of the said parties, the exclusive right of constructing and using said telegraph on the several lines of communication hereinbefore described and set forth, together with all the rights, privileges, preferences, and advantages of, or derivable from, the said letters patent, and which grantors, or either of them, have or may acquire by virtue of their joint or several discoveries or improvements relating to the subject matter of said patent, on which are enumerated or contemplated for use and improvement, in and by the articles of agreement and association herein before described; and the same are hereby conveyed as aforesaid to said Eliphalet Case, in his said capacity of trustee, he accepting said trust accordingly, and as fully as we, or either of us, could or might convey by any other instrument; said articles of agreement and association being made a part of these premises as fully as if herein set forth.

To have and to hold the same in trust as aforesaid to him, the said Case, his associates, and for the benefit of said grantors and associates, contemplated in said articles of agreement and association; and upon the condition and limitations that are in and by said articles prescribed. And I, the said Eliphalet Case, jr., for and in consideration of these premises, and said articles of agreement and association, hereby accept said conveyance and transfer, to have and hold the same in trust as aforesaid.

Done at the city of Washington on this twenty-first day of December, A. D. 1846, under our respective hands and seals.

SAML. F. B. MORSE, [SEAL.]
ALFRED VAIL, [SEAL.]
LEO. D. GALE, [SEAL.]
By their attorney in fact, AMOS KENDALL,
FRANCIS O. J. SMITH, [SEAL.]
ELIPHALET CASE, JR. [SEAL.]

Signed, sealed and delivered in the presence of—
JNO. J. HALEY,
THOMAS JOHNS.

Received and recorded 23d December, 1846.

Assignment—Case, Wright, &c., to F. O. J. Smith.

Whereas Eliphalet Case, jr., by deed, dated the 16th day of January, 1847, executed by him and John C. Wright, Lewis Worthington, George S. Coe, and Abel C. Thomas, conveyed to them to hold with him in trust for the Western Telegraph Company, the right to construct and use Morse's Electro-magnetic Telegraph on certain lines of communication therein fully expressed, under a power contained in a deed of trust of the same right from Samuel F. B. Morse, Alfred Vail, Leonard D. Gale, by their attorney in fact, Amos Kendall, and by F. O. J. Smith, as grantors, and by said Eliphalet Case, jr., as grantee, and dated the 21st day of December, 1846.

And whereas the parties in interest are now desirous of closing said trust, and of fully cancelling the same; now, therefore, these presents witness, that for and in consideration of the premises, and of one dollar to us in hand paid, the receipt of which is hereby acknowledged, we, the above named Wright, Worthington, Coe, Case, and Thomas, hereby grant, assign, release and convey the said right in us vested, to construct and use said telegraph to the said Francis O. J. Smith, as fully and entirely as the same is now held by us, and fully and absolutely cancel said deeds of trust respectively.

In testimony whereof we have hereto set our hands and seals this 10th day of December, A. D. 1847.

ELIPHALET CASE, JR., [SEAL.]
J. C. WRIGHT, [SEAL.]
L. WORTHINGTON, [SEAL.]
GEORGE S. COE, [SEAL.]
By his attorney, JOHN C. WRIGHT,
ABEL C. THOMAS, [SEAL.]
By his attorney, J. C. WRIGHT.

Signed, sealed, and delivered in our presence—
TIMOTHY WORTHINGTON, to the signature of E. CASE.

Whereas Eliphalet Case, jr., John C. Wright, Lewis worthington, Abel C. Thomas, and myself, by virtue of a deed of trust, dated the 16th January, 1847, executed by us, hold in trust the right to construct and use Morse's Electro-magnetic Telegraph on certain lines, in said deed more fully described. And whereas, it is now desired to release and re-convey said trust, I hereby constitute and appoint John C. Wright and L. Worthington, or either of them, my attorney to execute for me, and in my name, any such deed of release or re-conveyance as they may deem expedient, hereby confirming their or either of their acts in the premises, to have the same effect as if executed by me personally.

Witness my hand and seal, this eighteenth day of December, 1847.
GEO. S. COE, [SEAL.]

Witness—
JNO. L. MUHLE.

(Received and recorded 24th March, 1848.)

The following are the copies of the correspondence between Samuel F. B. Morse and H. L. Ellsworth, commissioner of patents.

Correspondence—S. F. B. Morse to H. L. Ellsworth.

The United States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify, that the annexed is a true copy of all the letters that I have been ableto find on file in this office, addressed by Samuel F. B. Morse, previous to and including the twenty-ninth day of May, A. D. eighteen hundred and forty.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this twenty-third day of April, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of the United States the seventy-third.

[L. S.]

EDMUND BURKE.

NEW YORK CITY UNIVERSITY,
August 28th, 1837. *Monday.*

To HENRY L. ELLSWORTH, esq.

MY DEAR SIR: I send you a paper in which you will see noticed an invention of mine.

I intend to apply for a patent so soon as I have submitted some parts more thoroughly to experiment, and I wish to know whether I can enter a caveat against the patenting of any telegraph which shall be formed for communicating intelligence by means of electro-magnetism, or voltaic electricity, or common electricity.

It is nearly five years (within a few weeks,) since I not only conceived the idea of such a telegraph, but proceeded to put it partially into execution, and communicated the whole process now in operation to many, who can testify to the same. I am doubly anxious to secure the patent, on my own account, and on account of securing the credit of it to the country, if it should prove what intelligent, scientific men on both sides of the water think it will be.

With sincere respect and esteem, your old friend and classmate,

SAM. F. B. MORSE.

HENRY L. ELLSWORTH, esq.

MY DEAR SIR: I received your pamphlet of instructions concerning patents, and shall as soon [as] possible prepare my papers for a caveat in the case of my telegraph, which, I am happy to say, proves successful in the experiments already tried with it. Since the experiment (the result of which I enclose you) I have added over 900 feet of wire, making half a mile, and find no difficulty in the recording qualities of the register. Accept my thanks for your politeness.

Truly your friend and classmate,

SAM. F. B. MORSE.

N. Y. UNIVERSITY, *Sept. 16th*, 1837.

NEW YORK, *October 4th*, 1837.

Hon. HENRY L. ELLSWORTH.

MY DEAR SIR: By this day's mail I send you the papers (which I believe are in order) necessary to obtain the filing of a caveat for my invention of the electro-magnetic telegraph, and at the same time twenty dollars, being four half eagles, the sum required by law for the purpose, in a small parcel which I have committed to Mr. Taylor, of our post office.

I hope to have the pleasure of seeing you in Washington before the close of this year, and to show you the telegraph in perfect action. I had the gratification of *shorsing* it to Dr. Jones on his late visit here, and was much pleased in being made acquainted with him.

Sincerely, dear sir, your old friend and classmate,

SAM. F. B. MORSE.

NEW YORK CITY UNIVERSITY,
May 15th, 1838.

Hon. HENRY L. ELLSWORTH.

DEAR SIR: Excuse the delay in answer[ing[your letter of the 1st inst. relative to a duplicate set of drawings for my letters patent. May I ask the favor of you to delay issuing the letters patent until you hear from me in Europe, as I fear issuing them here will at present interfere with my plans abroad. I sail to-morrow in the ship Europe for Liverpool. Farewell; many thanks for the kindness and hospitality shown me by you and Mrs. Ellsworth when I was in Washington. Please present my best respects to her, and believe me truly, your friend and servant,

SAM. F. B. MORSE.

NEW YORK, *May 2d*, 1840.

Hon. H. L. ELLSWORTH,
Commissioner, &c. &c.

MY DEAR SIR: I have never received my patent papers from your office. I believe there was something to be done on my part in relation to a drawing for one of the duplicates, which I was prevented from accomplishing by the necessity of preparing suddenly for my visit to Europe with the telegraph. I have nearly completed an improved apparatus, for which I intend to take out a patent, adding it to my patent already executed as an improvement. I should long since have visited Washington with my apparatus, and asked for some action upon the matter by Congress, but for the low state of financial affairs, private and public. So far as the approbation of the scientific and mechanical world goes, I have had the gratification of having had it loudly and substantially expressed that my telegraph is the best of all that had been examined. But while in England, the very complicated and deficient apparatus of Wheatstone is carried into operation by a wealthy company for 13 miles, and is in further progress; and while

the telegraph of Steinhiel, at Munich, is adopted, and is carrying into effect by the Bavarian Government, I am fettered and prevented from bring[ing] the American telegraph (the first invented as dates conclusively show, and the best according to the opinion of the best judges of the case here and in Europe, as I can also show) into operation from want of a little assistance from our Government. I was first encouraged to offer my telegraph to the Government by letter from the Secretary of the Treasury, drawing my attention to the subject; then by the report of the committees in Congress to whom the subject was referred, and by the report of a bill for a sum sufficient to test its practicability. I have been hoping that an invention which is to succeed just as surely as steam travelling has succeeded—an invention which is truly an American invention—would be in a sense adopted by the Government, and an opportunity given me to bring it forth in full operation, to the honor of the country. I have spent time, strength, and money to accomplish this; have been exercised with the alternate hopes and disappointments of an inventor; and unless something is done to help me forward, the more wealthy Englishmen will have it in their power not merely to deprive me of the profit of my discovery in my own country, as they have already, in their own, by a gross act of injustice, but, as in the case of Hadley's quadrant instead of Godfrey's quadrant, the telegraph will be an English, not an American, invention.

I could tell you a long story on the point, but long stories are not for gentlemen in official stations who have their time often too thoroughly consumed by the intrusion of time-killers.

Please tell me what I am to do in order to have my letters patent for the telegraph and I will do it.

Make my best respects to Mrs. Ellsworth and your family, and believe me, with sincere respects and esteem,

Your friend and classmate,

SAM. F. B. MORSE.

NEW YORK, *May* 18*th*, 1840.

DEAR SIR:

I herewith return you the specification of my telegraphic invention which you sent me to correct, and to add a duplicate set of drawings. I hope all will be found to be correct. My improvements shall be specified, and accompanied with drawings, and sent you as soon as I can complete the new apparatus which is in progress, and which I hoped to have had the pleasure of showing you in Washington this spring. But it is now so late in the session, and you are all so engaged at headquarters in fighting the presidential battle, that I fear my lightning will not have a fair chance till next fall.

Hoping to see you at the class meeting in New Haven in August next, to celebrate our 30 years exit from college,

I remain, truly as ever, your friend and classmate,

SAM. F. B. MORSE.

NEW YORK, *May* 29, 1840.

DEAR SIR:

I return the specification of my patent with the corrections you have suggested.

Sincerely your friend and serv't,
SAM. F. B. MORSE.

Hon. HENRY L. ELLSWORTH,
Commissioner of Patents, &c.

Correspondence—Ellsworth's letters to Morse.

The United States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify that the annexed are true copies from the records of this office.

In testimony whereof I, H. H. Sylvester, acting commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, this ninth day of October, in the year of our Lord one thousand eight hundred and forty-eight, and of the United States the seventy-third.

[L. S.]

H. H. SYLVESTER.

PATENT OFFICE, *Sept.* 1, 1837.

Mr. S. B. MORSE, New York city University, N. Y.

SIR: Yours of the 28th ult., was this morning received. I enclose the office circular, (which) will fully instruct you on the subject of caveats. Fees are now requested to be paid in coin, which may be transmitted per mail free of postage.

Your affectionate classmate,
H. L. ELLSWORTH.

P. S. I have received the Journal of Commerce with pleasure, mentioning your discovery and —ment.

PATENT OFFICE, *Oct.* 6, 1837.

SIR: I have to acknowledge the receipt of your caveat, with the fee of $20, and to inform you that the same is duly filed agreeably to your request.

H. L. ELLSWORTH.

SAML. F. B. MORSE, New York city, N. Y.

PATENT OFFICE, *May* 1, 1838.

SIR: Your application for a patent for an electro-magnetic telegraph has been examined, and a patent ordered to issue therefor. Before it can be placed in hands to be engrossed, a second copy of the drawing must be deposited in the office; if you desire it, the copy in

hand will be transmitted to you to prepare the duplicates, or if you wish it, a duplicate can be executed by one of the agents in this city.

H. L. ELLSWORTH.

Prof. S. F. B. MORSE, New York.

PATENT OFFICE, *May* 14, 1840,

SIR: The specifications and drawings of your alle*d*ged improvement, in the mode of communicating signals by the application of electro-magnetism, are herewith returned to you, the explanatory references in the same not being sufficient to properly illustrate the invention. Some annotations pointing out the parts where those are wanting, are marked in pencil on the margin of the description.

Your favor of the 2d instant has been received, in reply to which the office has to state, that the delay attending the granting of your application has not been caused by any want of attention on its part. Some two years since, when your patent was about being issued, a request was made by you that the case might be postponed until you should have received letters patent from the European Governments. This request was complied with, and as no communication has been received from you since in relation to the issueing of the patent, the case has been permitted to lie over. The patent will be issued, however, immediately on the return of your papers. H. L. ELLSWORTH.

Prof. S. F. B. MORSE, New York city, N. Y.

PATENT OFFICE, *May* 26, 1840.

SIR: On receiving the specification of your magnetic telegraph, before ordering the case to issue, a slight defect has been found in the oath, which it will be necessary to correct, and which, on the previous examination, escaped the attention of the examiner. The defect in the oath is its being without a date, the blank left for that purpose never having been filled up; and as it might affect the validity of your patent were the office to let it pass in its present form, your better plan will be to make a new affidavit, which must be taken before the mayor or recorder of your city, as justices of the peace in your State are not authorized to administer general oaths. It would be well, also, were you to make the alterations in the specifications suggested in the note which you have made in the margin of it, as it would make the description more clear. HENRY L. ELLSWORTH.

Prof. SAML. F. B. MORSE, New York city, N. Y.

PATENT OFFICE, *June* 20*th*, 1840.

SIR: Enclosed you will receive S. F. B. Morse's patent, which has been duly recorded. H. L. ELLSWORTH.

MR. SAML. F. B. MORSE,
New York city, N. Y.

Ex'd.—W. W. S.

The French patent is as follows, to wit:

French patent.

Ministère des travaux publics de l' agriculture, et du commerce, direction du commerce intérieur des manufactures et des etablissements sanitaires, bureau des manufactures. No. 9124. Expedition.

Brevets d' invention de perfectionnement et d' importation, établis par les Lois des 7 Janvier et 25 Mai, 1791. Certificat de demande d'un brevet d'invention et de perfectionnement de quinze ans, delivré a M. Morse à Paris, departement de la Seine.

Vu la requête de M. Morse, (Samuel F. B.,) des Etas Unis, represente à Paris par Perpigna, rue de Choiseul No. 2, ter. dans laquelle il expose que désirant jouir des droits de propriété temporaire accordés et garantis aux auteurs et importateurs des découvertes et perfectionnements en tout genre d'industrie, il demande un brevet d'invention et de perfectionnement de quinze ans, pour un systeme de telegraphie fonde sur l'electro-magnetisme; dit telegraphie de Morse, qu'il declare avoir inventé et perfectionné ainsi qu'il résulte du procès-verbal de dépôt des pièces effectué sous cachet, au Secrétariat de la Préfecture du département de la Seine, le 18 Août dernier; vu le memoire descriptif et les trois dessins en double, joints à l'appui de la dite requête; vue aussis les lois des 7 Janvier et 25 Mai, 1791. Le Ministre Secrétaire de Estat, au departement des travaux publics, de l'agriculture, et du commerce, s'étant asuré que toutes les formalités prescrites par ces deux lois ont été rempliés par M. Morse, à fait dresser ce certificat de sa demande d'une brevet d'invention et de perfectionnement de quinze ans, pour un système de telegraphie, fonde sur l'electro-magnetisme du telegraphie de Morse; demande dont il lui est provisoirement donné acte, en attendant que, suivant les dispositions de l'arrêté du Gouvernment du 5 vendemiaire, an 9, (27 Septembre, 1800,) le dit brevet soit rendu définitif par une ordonnance de sa Majesté, et proclamé par l'insertion de sa spécification au bulletin des lois, ce qui aura lieu au commencement du trimestre prochain.

Le ministre ordonne en outre—

1o. Que le memoire descriptif et tres des doubles des dessins, ci-dessus rappelés resterons annexés au présent certificat.

2o. Qu'une expedition en bonne forme de ce même certificat, laquelle devra être suivie de la copie litterale du dit memoire descriptif, et de l'autre double des dites dessins, sera transmise cachetée au préfet du departement de la Seine, pour être delivrée à M. Morse.

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* Le Gouvernement, en accordant un brevet d'invention sans examen pretablí, n'entend garantir en aucune manière ni la priorité, ne le mérite, ni le succès d'une invention. (Article 2 de l'arrêté du Governement du 5 vendémiaire, an 9, 27 Septembre, 1800.)

PARIS, *le* 30 *Octobre*, 1838.

Pour le ministre secrétaire d'etat des travaux publics, de l'agriculture, et du commerce, et par delegation.

Le maître des requêtes, secrétaire general.

Signé, J. BOULAY.

Suit le copie du memoire descriptif.

Introduction.

Il consiste—

1o. En un circuit de conducteurs electriques ou galvaniques partant, d'un générateur d'électricité ou de galvanisme, avec des electro-aimants* à divers points dans le dit circuit.

2o. En un systéme des signes à l'aide des quels on peut transmettre sur un ou plusieurs points du dit circuit des nombres, des mots représentés par des nombres, des séries de mots et de nombres, des lettres, & des signes, quelle qu'en soit la combination & la qualité:

3o. En une sérié de caractères pour réglér la communication des signes ci-dessus mentionnés, en des boites pour conserver les caracteres, et des composteurs pour placer et employer les dits caractères.

4°. En un appareil appelé porte-composteur rectiligne.

5o. En un leviér de signal qui interrompt et rétablit la communication dans le circuit des conducteurs.

6. En un rapporteur qui constate d'une manière permanente les signes communiqués à un des points voulus du circuit.

7. En un dictionaire ou vocabulaire de mots auxquels sont adaptés les chiffres pour les ussager qui seront ci-après decrits.

8. En une manière de disposer le circuit des conducteurs.

9. En une manière de decouvri les lacunes ou interruptions dans les conducteurs.

Circuit de conducteurs.

Ils peuvent être faits de toute espère de métal tel que fil de cuivre ou de fer, rubans de cuivre ou de fer, cordes ou ficelles, ou autres substances dorées, argentées, ou couvertes de feuilles metalliques convenablement isolées et enforcées, dans la terre ou derigées à traverse l'eau, ou suspendues dans l'air. En faisant circuler un courant de fluide electrique ou galvanique dans la circuit de conducteurs, disposés il a é é dit. La circulation partant d'un générateur d'electricité on de galvanisme et aboutissant à un ou plusieurs electro-aimants placés sur un ou plusieurs points dans le dit circuit la puissance magnétique, aisi concentrée dans cet aimant ou ces aimants est employée pour produire des sons et des signes visibles, et pour conserver la trace de ces derniers, sur un ou plusieurs points au gré de l'operateur et de la manière qui sera ci-après decrite.

*J'entends par electro-aimant un pourceau de fer douz entouré de fils metalliques et qui devient aimanté quand le courant electrique traverse les fils metalliques, & cesse de l'être quand le dit fluids cesse de circuler à traverse les fils métalliques.

Des signes.

Le systeme de signes se compose des parties et des variations suivantes.

Premiere disposition. Les signes reproduisant les chiffres, consistent:

1o. En dix points formés à des distances d'égale étendu, sur du papiere ou toute substance ramplaçant le papiere, et correspondent en nombre avec le chiffre que l'on veut représentes.

Ainsi un point reproduit le chiffre - - -	1
Deux points sont employées pour le chiffre - -	2
Trois points pour le chiffre - - - -	3
Quatre points pour le chiffre - - - -	4
Cinq points pour le chiffre - - - -	5
Six points pour le chiffre - - - -	6
Sept points pour le chiffre - - - -	7
Huit points pour le chiffre - - - -	8
Neuf points pour le chiffre - - - -	9
Dix points pour le chiffre - - - -	0

Ainsi qu'il est representé dans les desseins ci-joints, example 1, mode 1, dans le quel est aussi indique un second caractère pour représenter le 0, et qu'on peut employer à volonté.

2o. Variation. Les chiffres peuvent être représentés par des lignes tirées en nombre égal à celui des points, et reproduites dans le dessins ci-joints; example 1, mode 2.

3o. Variation. Les chiffres peuvent encore être repésentés par des caractères dessines à des distances reglées et en forme de dents de scie ou moyen d'un crayon ou de tout autre instrument servant à marquer. Le dents de scie indiquent par leur nombre le chiffre demandé, comme dans le cas ou l'on emploie de points ou des lignes; cette variation est indiqué, example 1, mode 3.

4o. Variation. Elle se compose de points et de lignes séparement et conjointement comme suit: le chiffres 1, 2, 3, 4, sont represéntés par des points comme pour le première mode indique ci-dessus.

5 est représenté par une ligne égale à la distance existant entre deux points de tout autre numbre.

6 est représenté en ajoutant un point à la suite de la ligne indiquant le chiffre 5.

7 est représenté par la même ligne suivie de deux points.

8 est représenté en faisant precéder d'un point la même ligne.

9 est représenté par deux points précédant la même signe.

0 est représenté par deux lignes dont chacune est double de la longueur de la ligne représentant 5. Cette variation est représentée dans les dessins ci-joints; ex. 1, mode 4. Un de ces modes devra être employé selon qu'on le preferera et de la manière qui sera ci-après décrite.

Pour indiquer un chiffre unique, ou composé, quand il est employé dans un série de mots ou de chiffres, on laisse entre les signes une distance plue grande que celle employée entre les signes indicateurs d'un

même nombre ou d'un même mot voyer; example 2, des dessins ci-joints.

Les signes des lettres consistant dans des variations dans les points ou marques, dans les points et lignes, et dans les espaces de separation qui constituent les signes des chiffres, et sont variées & combinés differemement pour représentir les lettres de l'alphabet, d'une manière spécialement indiquée et représentée aux dessins ci-joints; example 3.

Le signe d'une lettre isolée ou d'un mot distinct quand il est employé dans une phrase, est le même que celui indiqué pour les chiffres distincts et ci-dessus décrit. Les signes représentant des mots ou même des phrases peuvent être adoptés pour la communication, sous des formes variées, de la manière qu'on pigera convenable.

Les caractères pour produire les signes repésentatifs des chiffres consistent en 14 morceaux de metal mince, tel que du metal a caractères d'impression, du lacton, ou d'autres substances semblables, avec des dents ou des indentations practiquées sur un des bords de dix des dits caractères, et correspondent en nombre avec les points ou marques requises pour former chacun des chiffres, ainsi qu'il a été decrit ci-devant; ces caractères ont paréillement un espace sans dents sur le même bord et à une des extrémités; lequel espace correspond en longueur avec la separation qui doit exister entre chaque signe représentatif de chiffre.

Un autre caractère a deux indentations, formant ainsi trois dents seulement et sans espace à l'un et à l'autre bout, correspond à la largeur du sign representant zero, ainsi qu'il a été decrit relativement à exemple 1, modes 1, 2, et 3 des dessins.

Un autre caractère ne porte aucune indentation sur son bord, et est assez long pour correspondre avec la distance au separation laissée entre des chiffres distincts ou composés, et avec le signe ci-devant decrit pour cet objet.

Un des deux derniers caracteres affecte une forme ovale, et est appelé le repos, et l'autre se termine en pointe, et est appele l'arrêt.

Tous ces caractères sont représentés dans les dessins ci-joints, exemple 4, fig. 1, et portent des nos. ou des indications relatives à leur objet.

Ces caractères sont employés de la même manière pour produire chacun des divers signes de chiffres ci-devant decrits.

Seconde disposition. Les caractères pour produire les signes de chiffres consistent en cinq plaques de métal ci-devant decrites, dont quatre sont semblables à celles marquées des Nos. 1, 2, 3, 4, dans les dessins, exemple 4, fig. 1, et le cinquième etant celui qui dans le même exemple porte le titre de long espace.

Les six autres morceaux de métal ont des dents ou indentations et des espaces variés, ainsi qu'il est représenté dans le dessin ci-annexé, exemple 4, fig. 2, pour produire le signes decrits dans la quatrième variation relative aux chiffres, exemple 1.

Caractères pour lettres.

Ils sont de la même nature que ceux employés pour les chiffres, ils varient seulement sous la rapport de la forme, et sont au nombre de 23, ex. 5.

Les caractères représentant le chiffres et les lettres sont placés, quand on vent les employer dans un composteur rectiligne, et sont à faces rectilignes, ainsi qu'il est représenté aux dessigns, exemple 5. Ils peuvent encore être posés dans un composteur circulaire, au quel cas leurs faces interne et externe sont circulaires ou forment portion d'un circle ainsi qu'il est represénté aux dessins, exemple 6, fig. 2 et 3; ce qui sera mieux compris par ce qui sera dit ci-après des composteurs rectilignes et circulaires.

Les caractères employés pour le composteur circulaire, qui sont plus épaise que ceux employés pour le composteur rectiligne, portent une rainure à moitié de leur larguer, profonde à moitié de leur epaisseur, et s'étendant de l'extrémité servant á indiquer l'espace, sur la longneur du dit caractère dont elle suit la courbe, jusqu'à un point à égale distance des extremités opposés, et à moitié la larguer des dents decoupées sur leur circonférence. Le trace de ces dents est reproduit, fig. 1 et 3, exemple 6.

Porte-composteurs.

Ils sont en bois ou métal, ou en autre matière appropriée, de la longueur d'environ trois pieds, avec une rainure dans la quelle se place le composteur quand on vent en faire usage. La partie inferieure de ces porte-composteur est d'entrée en cremaillére, dans les dents de la quelle s'engrignon formant partie du porte-composteur, quand on se sort du composteur il est mis en marche par un mouvement imprimé au dit pignon. Le porte-composteur est représentée dans les dessins ci-joints, exemple Z.

Cases à caractères.

Elles sont faites en bois ou toute autre matière convenable avec de petits compartements de l'exacte hauteur des dits caractères pour les distribuer plus convenablement; ces cases ressemblent à cettes employées par les imprimeurs.

Composteur rectiligne.

Il est représenté dans les dessins ci-joints, exemple 8, fig. 1, 2, 3.

a. Pignon denté.
b. Manivelle partant une vis d'Archimede.
c. Roue dentée.
d. Rainure ou coulisse.

Le pignon est tourné par la manivelle et la vis d'Archimede, cette dernière engrenant les dents taillées sur la circonference du pignon.

Sur le même arbre qui porte le pignon à est montée la roue dentée C, d'un plus grand diamêtre, tournant avec la même vitesse que le dit pignon. La roue C, engree les dents Z Z Z, de la cremaillére du porte-composteur F, et le fait avancer dans une direction rectiligne sous de levier qui interrompt et rétablit le circuit galvanique ou electrique de la manière qui sera ci-après dite.

Composteur circulaire.

Il remplace, quand on le prefére le composteur et porte-composteur rectilignes; il se compose d'une roue horizontale ou inclinée A (exemple 9 des dessins ci-joints) d'un diamêtre convenable, un bois ou en metal, dont l'aux est lié à sa partie infèrieure à un pignon t, semblable à celui du porte-composteur rectiligne; cette roue est mise en mouvement par l'action d'un pignon comme le porte-composteur rectiligne. Sur toute la circonférence de la roue horizontale ou inclineé, et sur sa face superieure existe une cavité, d'une profondeur égale à l'epaisseur des caractères employés, et d'une larguer égale à celle des dits caractères sans comprendre leurs dents.

Prés de la partie exterieur de la cavité, sont taillées des dents sur la circonférence de la roue, placées verticalemeent et a une distance calculée sur la moitié de la largeur des dents ou indentation que portent les caractères, et correspondant à la largeur et à la profondeur de la rainure pratiquée sur la partie inferieure des caractères circulaires cidevant decrits et representées, example 6, fig. 1 et 3.

Immediatement au dessus de la dite cavité et de ces dents, sur un ou plusieurs points de la circonference de la dite roue s'avance d'un point fixé, hors de l'orbite de la roue un appareil fixé pour alimenter la roue de caractères; cet appareil est formé de feuilles de fer blanc ou de laiton, ou autre substance, et d'une forme convenable pour rececvoir un nombre donné de caractères qui y sont déposés avec leurs dents saillant exteriourement et leurs rainures placées en dessous.

Le dit appareil d'alimentation répresenté, fig. 2, example 9, est suspendu par dessus la cavité de la roue A, de manière à permettre à la dite roue de passer par dessous le dit appareil pendant sa revolution aussi prés du fond du dit appareil qu'il est possible de le faire sans venir avec lui en contract immediat.

Les caractères déposés dans l'alimentateur forment une colonne perpendiculaire ceux inferiourement places reposant sur la surface de la rainure pratiquées dans la roue A, et la dont de la dit roue qui forme saillie, comme nous l'avons dit, penètre dans la rainure des caractères l'operation du composteur circulaire en regularisant le mouvement des caractères employes est comme suit, quand la roue est mise en mouvement, les caractères reposant dans la rainure de la dite roue sont partis en avant dans la courbe de la roue après s'être echappés du fond de la boite à caractères; les dits caractères son representés avec leur rainure, example 6, fig. 3. Comme par ce procédé les caractères placés au bas de la colonne continue dans l'alimentateur fixé, sont portes en avant,

les caractères qui reposaint sur *ain reterabent* successivement dans la rainure de la roue, et sont aussi porter en avant par l'action des dents de la roue. Ainsi se suivant successivement par le même moyen les caractères déposés dans l'alimentateur, aussi longtemps que la roue est maintenue en mouvement.

Les caractères sont deposés dans l'alimentateur dans le même ordre que celui dans le quel les lettres, chiffres, ou mots qu'ils réprésentent doivant être transmis à un ou plusieurs points du circuit.

Quand tous les caractères ont été portés en avant dans la courbe de la roue de la manière qui a été dite, et ont depassé le point où quel ils agissent sur le levier à signal, comme il sera ci-après expliqué, ils sont enlevés successivement de la rainure de la roue et jettés dans une boite ou poche sous la roue, au moyen d'une tige *d* formée de metal et ressemblant à un soi de charrue, et descendant d'un point fixé hors de la roue et pénétrant dans une rainure formée dans la roue interieurement aux dents de cette-ci. Au moyen de la dite rainure, la pointe de la tringle est armenée dans la courbe et sous l'autre mité du caractére, qui s'avance de manière que chaque caractère successivement, quand il est porté en avant dans la dite courbe est soulevé de la gorge et forcé de monter sur la regle incliné par l'action du caractère qui le suit, il est ainsi graduellement amené à tomber dans la poche sur dite ou on le reprend pour le distribuer de nouveau; les diverses parties du composteur circulaire sont représentées, example 9, fig. 1, 2, 3, 4, 5.

Composteur à frottement.

Le composteur à frottement est représenté, example 1, fig. 1 et 2.

A B, Deux roues en cuivre ou autre métal, ou autre substance.

C, Ressort.

D, Composteur en métal.

E E E, Double levier.

K, Pignon a manivelle.

gg, Vases de mercure.

h, Regles mobiles.

La circonference des roues A et B, peut-être unie, leurs axes sont également inclinés de manière que leur diametre superficiel corresponde avec le composteur D; l'axe de la roue B est stationaire, et la dite roue tourne sur lui. L'axe de la roue A est mobile, ainsi que le bras d, auquel il est lié. La roue est portée horizontalement contre la roue B, par l'action du resort C, et les deux roues viennent en contract à leur circonference quand elles n'en sont par empechées par l'interposition des caractères, ainsi qu'il sera ci-après. Le mouvement de la roue B, sur son axe stationaire imprime un mouvement semblable à la roue A, par le frottement des deux roues l'une contre l'autre, ou par celui des caractères interposés.

La roue B est mise en mouvement par un pignon d'angle KK, engrenant des dents d'angle taillées sur la face inferieure de la roue B.

Un systeme d'engrenages mis en mouvement par un poids ou un ressort peut remplacer la manivelle pour faire tourner le dit pignon.

Le composteur D porte une gorge suffisament profonde pour recevoir

les caractères rectilignes, ci-devant mentionnés, et affecte une position inclinée entre les roues A et B. Il est posée d'une ouverture ou fenêtre au point où les dits roues viennent en contract avec les parois de la dite regle; à traverse cette overture les deux roues arrivent en contract l'une avec l'autre, ou avec les caractères que contient le composteur; les caractères placés dans le composteur sont fournis selon le bessoin par les regles mobiles h, d'une construction semblable posées successivement à la partie supérieure; les caractères sont attirés par les roues AB, en raison du mouvement qui leur est imprimé et du frottement qu'elles exercent sur les caractères.

Immediatement au dessus des caractères lors de leur passage entre les dites roues à frottement est placé le double levier EEE, dont une dent i suit les contours irréguliers de caractères, et comme les caractères recoivent un mouvement progressif, le dit levier EEE, est élevé ou abaissé, ce qui elevé parillement ou abaisse la fourchette métallique fixée sur son extremité opposée, et la fait entrer dans les vases de mercure gg, ou retire de la même manière, et avec le même resultat obtenu quand un mouvement semblable est effectué par le leviér signal du composteur ci-devant décrit, c'est à dire, qu'on établit, ou qu'on interrompt ainsi à volonté la communication de courant de fluide électrique, avec un rapporteur de la nature ci-après décrite, et determinant la transmission et la consignation des signes telegraphique ci-devant énoncés. En peut employer celui des composteurs que l'on juge convenable, celui-ci appelé rectiligne, circulaire, ou à frottement, on peut les faire des dimensions qu'on juge convenables, et les renformer dans une boite si on le juge necessaire.

Levier à signal.

Le levier à signal se modifie de deux manières selon qu'il est appelé à agir sur le composteur circulaire, ou le composteur rectiligne ———. Du levier à signal pour composteur circulaire ———.

Il se compose d'une flèche en bois représenté en A, exemple 8, d'une longueur quelconque de 6 à 24 pouces reposant sur un pivot, ou dans un pilier fourche offrant un point d'appui au moyen d'une goupille métallique, qui le traverse A, une extrémité du levier est attaché par son centre un fil metallique C, courbe enforme mi-circulaire ou mi-carrée, et resemblant aux deux branches d'une fourchette à découper distendues.

Entre l'extrémité du levier et le point d'appui, et près de celui-ci à la partie inferieure du dit levier est fixée une dent metallique courbée à la partie qui s'approche du point d'appui, et sous d'autres rapports correspondant aux indentations pratiques dans les caractères comme il a été dit.

L'extremité opposée du levier porte un petite poids E, pour centre balancer en portie, quand cela est necessaire, le poids du levier sur le coté opposé an point d'appui.

Le levier ainsi disposé, est placé exactement sur la rainure ou coulisse qui reçoit le composteur rectiligne et constitue partie de ce que

nous avons apprété un porte composteur rectiligne. Le mouvement du composture amine l'indentation de chaque caractère en contract avec la dent D, du levier A, et par ce moyen soulève le dit leviér jusqu' à ce que les deux dents en contract se soient depasseés, alors le leviers descend de nouveau.

Cette operation est repétée aussi souvent que les dents des caractères sont amenier en contract avec la dent du levier. En faisant ainsi monter et descendre le levier, son extrémité qui porte la fourchette en fil de fer C, fait sortir celle-ci de deux vases gg, contenant du mercure, et les y fait entrer alternativement; dans chacun des quels vases vient aboutir un des conducteurs metalliques formant le circuit ci-devant decrit.

Le circuit metallique se terminant ainsi dans les deux vases, le circuit de l'electricité ou du galvanisme est limité; mais la communication est retablie quand la fourchette metallique, attachée au levier, plonge dans les deux vases et les met en rapport l'un avec l'autre. Quand on soulève le levier, le fil métallique qu'il porte à son extremité est retiré de deux vases, et le circuit est interrompu et le courant d'électricité ou galvanisme est détruit.

On produit à volonté ces deux resultats, c'est à dire, qu'on interrompt, et qu'on retablit le circuit au moyen des mouvements imprimes, comme il a été dit, au levier signal.

On reduit ces mouvemens à un system de signes intelligibles ci-devant décrits, ou moyen des diverses variations dans la forme des caractères que nous avons deja expliques.

On peut remplacer les vases en mercure, si on le préfére, par une plaque en cuivre, argent, ou autre bon conducteurs, reunie aux parties où le circuit des conducteurs est interrompu.

Exemple 9, *figs.* 1, 3, 4, *et* 5.

Levier à signal employé avec le compasteur circulair.

Il se compose dans ce cas d'une lame en bois portant un fil metallique à une extrémité de la forme et pour l'emploi dejà decrits.

Il tourne sur un pivot ou centre de mouvement placé soit près du centre, soit à l'extremité du dit levier.

A l'éxtremité opposée à cette portant le fil metallique est fixè un bras à angle droit avec le dit levier; le dit bras ou courde descend au dessous du pivot d'une quantité suffisante pour qu'une dent metallique, qu'il porte á sa partie inferieure, vienne en contract avec les dents ou indentations des caractères ci-devant decrits, et presse contre ceux-ci que projettent de la cavité de la roue formant le composteur circulaire. La dite roue est placé sous le dit levier dans une position qui permet au bras du levier d'attendre les caractères. Un ressort (que l'on voit dans l'exemple 9, en B, maintient par sa pression la dent que porte le bras du levier signal en contract constant avec les caractères du compositeur circulaire; l'action ainsi produite, par le contract des dents des caractères quand la roue est en mouvement avec la dent fixée au bras le

levier dive et abaisse l'extrémitée opposée du dit levier portant le fil metallique, selon que la dent entre ou sort des indentations des caratères ce qui realise de la même manière les effects signalis à l'egard du première levier à signal et qui comme nous l'avons vu consistent à interrompre et à rétablir la communication entre le circuit des conducteurs.

Dans l'emploi du composteur circulaire et de son levier on peut se servir de caractères ayant la pointe de leurs dents et leurs indentations façonnées en seur inverse de celui representé dans le dessin, et que nous avons decrit ci-devant, exemple 4, 5, 6, et de cette manière les formes des signes consignés par l'appareil rapporteur seront changés d'une manière correspondancé.

Rapporteur.

Il est représenté, exemple 11, figs. 1 et 2, des dessins ci-joints.

A, Levier.
B, Levier.
CCCCCC, Rouages.
D, Carillon ou Timbre.
E, Poids.
F, Cylindre devant recivoir la papier avec trois petits rouleaux pour satellites, m, m, m.
G, Roleau portant le papier.
H, Gros electro-aimant.
I, Petit electro-aimant.
JJ, Conducteurs mètalliques.
L, Generateur de fluide electrique ou galvanique.
M, Levier à frottement.

Description du rapporteur.

Le levier A sement sur une gorgille traversant la portion de sa partie inferieure qui enformé le coude. A l'extrémité la plus basse du dit levier, et vis-a-vis l'electro-aimant est attachée une armature d'electro-aimant h. Presque au milieu de la longueur du dit levier est fixé au point n, une au plusieurs plumes portant encre, des roues à imprimer ou d'autres instrument à faire des marques. L'electro-aimant H, occupe une position suffisamment proche de la dite armature h, sur l'extrémité inférieure du dit levier A pour que le dit aimant quand il est chargé, puisse attirer l'armature h, et la face de l'electro-aimant H, est interposée une substance même qui n'est pas electrique, telle que du papier, pour impêches l'adhesion de l'armature et l'electro-aiment, quand ce dernier n'est pas chargé d'electricité ou de galvanisme, et pour permettre à ce levier de conserver sa position première.

Des deux poles opposés du dit aimant H, des conducteurs métalliques JJ, s'éntendant à des poles correspondants du générateur de galvanisme ou d'electricité ci-devant decrit comme appliqué au composteur rectiligne. L'armature h, est ainsi attirée ou non attirée, selon que le

circuit du fluide à travers les dits conducteurs JJ, est établi ou interrompu. La dite armature étant tirée ou attirée de sa position horizontale et stationaire vers l'aimant H, quand ce dernière est chargé par le circuit des conducteurs JJ ; le levier A, alors tourne sur son axe et le bout opposé descend et amène nécessairement la plume ou l'instrument à marquer qu'il porte, en contact avec le papier ou autre substance sur le cylindre tournant F placé par dessous. La dite armature cessant d'être attiré par le dit aimant, comme ce la a lieu quand l'aimant cesse d'être chargé par le circuit de conducteurs, ou lorsque le courant est interrompu de la manière ci-dessus décrité, la dite armature est ramenée à sa position premiére par l'effet de sa propre gravité, par un ressort ou par un contre poids, selon qu'on le jugera convenable.

La plume ou l'instrument à marquer placé au milieu du levier est de nouveau élevé et cesse par conséquent d'être en contact avec le papiere ou autre substance placée sur le cylindre F.

Cette même action est communiquée simultanément du circuit de conducteurs à autant de rapporteurs qu'on a disposé d'aimants correspondans dans chaque circuit et à telles distances qu'on ait jugé convenable de les placer. Le cylindre F est en bois ou en métal; il est placé sous la plume, la roue à imprimer ou tout autre instrument à marquer dont on fait usage ; il tourne sur un axe et dans coussinett montés dans le habits de l'appareil. Trois rouleaux marqués m, m, m, sont liés dans leur mouvement au cylindre F, et rendus eux mêmes solidaires dans leur mouvement respectif au moyen de deux rubans étroits qui passent par dessus, et par dessous l'extrémité des dits rouleaux, et en même temps par dessus la surface du cylindre F, de manière à produire un frottement des rubans sur le cylindre F, quand il est en mouvement, ainsi qu'il est représenté aux point o, o, o.

La distance entre les dits rubans est suffisante pour permettre à la plume ou autre instrument à marquer d'agir dans l'espace intermidiaire. Près du cylindre est un rouleau G, tournant sur un axe et sur lequel ou enroule une bande de papier ou autre substance formée en bande, ou un ruban contenu, pour recevoir et conserver le tracé des signs transmit. Quand le rapporteur est en mouvement, une extrémité du papier que porte le rouleau G, est placé sous le première rouleau m, et les rubans qu'il porte, par dessus le cylindre F, et par dessous les deux autres rouleaux m, m. Un mouvement étant imprimé au cylindre F, il entraine par le frottement des rubans la bande de papier qui passe par dessus le dit cylindre sous les rouleaux et sort pour tomber dans une boite placée à l'extrémité opposée ; au lieu de laisser la bande de papier tomber dans la boite on peut la couper à la longueur que l'on desire. Le levier A, à son extrémité la plus eloignée de son point d'appui porte une petite goupille p, qui repose sur un bras de levier en portion de la détente d d; qui est represénté fig. 2, exemple 11, des dessins ci-joints. Quand la plume qui porte le levier A est en contact avec le papier qui recoit le tracé, la dite détente d, est abaissée et tourne sur son axe g dans la position représentée par des lignes pondiscés e e. L'axe de la détente d porte la roue k. Le frottement de

la détente d d sur son axe, qu'est encore augmenté par un petite ressort r est suffisant pour mouvoir la ditte détente dans la position marquée e e, precisement lorsque l'axe g de la roue k, est porté dans cette direction, et toutes les fois que la goupille p dans le levier A, n'est par en contact avec la détente, celle ci pousse son axe dans une direction inverse et le maintient stationaire. Mais dans son mouvement avec la roue k, et son axe, la dite détente est intercepté et abaissée aussi souvent que la goupille p dans le levier A vient en contact avec la dite détente B, levier qui a son point d'appui en S et s'etend d'une longueur convenable pour atteindre deux vases de mercure g g. Près de son point d'appui il repose sur la partie superieure de la dite détente d d. Un fourche en métal à l'extremitée du levier B, plonge dans les dits vases g g, toutes les fois que l'extremité du dit levier s'abaisse, elle s'éléve aussi toutes les fois que le dit levier s'éléve.

L'ascension et la descente du dit levier est effectuée par la montée et la descente de la dite détente d d. De l'un de ces deux vases de mercure un fil metallique s, ou autre conducteur metallique, s'éntend à un pôle d'un générateur d'électricitée ou de galvanisme, ou à une batterie L de l'autre vase par un autre conducteur t, qui va joindre l'ectro-aimant marque I, formé comme l'autre electro-aimant ci-devant décrit, et communiquant par une continuation du même conducteur avec le pole opposé du generateur d'electricité ou de galvanisme L, ou moyen des dits vases de mercure, des conducteurs de l'ectro-aimant, et du générateur, un circuit complet pour le fluide électrique est formé toutes le fois que la fourche que porte le levier B est plongé dans les deux vases, et le dit circuit est de nouveau interrompu toutes les foi que la fourche est retirée des vases remplis de mercure. M est un levier à frottement, ayant son point d'appui en V avec l'armature d'un aimant à une extremité et marquée i. L'autre extremitié du levier M est reunie par une corde passant par dessus une poulie à une poids K, ce qui fait que le dit levier, quand il ne recoit par l'action de l'ectro-aimant I de la manière qui sera ci-après décrité, presse sur l'axe du volante qui forme une partie de la série de roues liées au rapporteur de manière à arreter completement le mouvement de la dite roue, et par conséquent le mouvement de toutes les roues.

L'elecro-aimant I occupe une position qui lui permet, quand il est chargé de fluide electrique de magnetiser l'armature du dit levier M, et de l'attirer avec une force suffisante pour surmontre le poids K attaché à l'autre extrémitée du dit levier, et à detruire ainsi son frottement ou son contact avec le volant. Le volant étant ainsi affranché subit ainsi que le restant des roues l'action du poids dont nous parlerons ci-apres, et toute la série des roues est mise en mouvement, le quel mouvement continue jusqu'à ce que l'aimant I cesse d'exercer son action.

Ainsi, l'appareil lui même met en mouvement les rouages de la manière suivante: quand le circuit des conducteurs J J, qui est ètabli outre des points éloignes, et qui réunit le composteur avec le rapporteur, est

chargé de fluide électrique, aureant son action par le moyen de l'aimant H ci-devant decrit, et communiquant avec l'armature de la plume qui s'est à tracer les signes, cette plume est amenée en contact avec le papapier, qui reçoit les signes, et en prenant cette position elle presse au moyen de la goupille ci-devant mentionnée sur le bras inferieur de la détente d d, la quelle est amenée à la position e e.

Par suite de ce changement l'autre levier B tombe et plonge sa fourche dans le vases g g, et complete ainsi un nouveau circuit de conducteurs métalliques, partant de la batterie L agissant par l'intermediaire de son aimant I sur l'armature l du levier M, qui tourne sur son axe v, et suppremant le frottement du dit levier contre le volant. Cela étant accomplí tout le systême de rouager est mis en mouvement.

A aussi long temps que l'action de la plume maintient la détente d d dans la position e, le circuit pour le fluide electrique est maintenu complet, la batterie L est maintenue en action, et par conséquent le levier à frottement n'interrompt par le mouvement des roues; mais aussitôt que la plume cesse d'agir sur la détente d d, le dit levier est entrainé doucement par le mouvement de la roue K, dans la position qui fait montre le levier B, et souléve la fourchette de vases g g; ce mouvement détruit le circuit du fluide dont laimant I a besoin pour son action sur le leviér à frottement M. Le poids K controle la marche du dit leviér, et détermine son contact et son frottement contre le volant de manière à arreter le mouvement de tout les rouages, comme il a été ci-devant décrit. La série des roues dont il fait usage, ressemble à celles d'une pendule ordinaire, elles sont activées par le poids E, exemple 11, et indiquées par c c c c c c.

Le poids E est remonté quand cela est nécessaire au moyen d'une manivelle W, le mouvement des dite roues est varié en variant le poids E pour le faire correspondre avec l'action imprimée à la plume.

Un cimbre est fixé sur l'une des murailles de la boite contenant les dites roues au moyen d'un bras en bois, sur le quel le dit timbre est vissé et qui peut tourner sur une goupille vers le volant des dites rouages. Chacune de ces lettres, ou une d'elles seulement, soutient au moyen d'une cource chaine une petite balle de plombe, ou autre metal, qui frappera le timbre toutes les fois que le rapporteur sera mis en mouvement. La distance entre le cimbre et le volant pouvant être disminuée à volonté en faisant avancer ou reculer le timbre de manière à permettre à la balle suspendue d'attaindre et de frapper le timbre quand le volant est en mouvement. Par cette disposition du carillon, combiné avec les engrenages du rapporteur, on donne un signal que continuera pendant que le rapporteur sera en mouvement, à moins que le cimbre n'a soit mis *haer* de la partie de la balle suspendue à l'ailette.

Observation.

L'electro-aimant employé dans cet appareil est composé par un des moyen connus en entourant avec de fils ou des rubans de cuivre ou d'étain une barre de fer doux, soit droite soit courbée en fer à cheval, et

en maintenant les deux extremities du fil liées au circuit de conducteurs de manière que les helices qui entourent l'aimant forment partie du circuit.

Extension des circuits.

Je puis augmenter la longueur des circuits de conducteurs et repartir le pouvoir du courant électrique ou galvanique également sur toute leur étendu; je puis réunir paréillement et faire usage d'une nombre quelconque de batteries ou de génerateurs du dit courant, et aussi faire communiquer progressivement en nombre voulu de circuits consecutifs, ce que j'effectue de la manière suivante: Je place à un point quelconque du circuit un aimant electrique de la construction ci-devant décrité (A, exemple 13,) avec une armature montée sur un levier B, des même forme et construction, et dans la même position que celui employé dans la rapporteur pour recevoir et faire fonctionner l'instrument à marquer; seulement comme celle appartement au levier à signal ci-devant décrit.

Sous cette fourchette C sont placés deux vases gg, remplis de mercure, communiquant respectivement avec l'extremité des conducteurs, venant d'une autre batterié D, ou générateur de courant electrique. Quand le courant dans le premier circuit agit her l'electro-aimant ainsi disposé, son armature et le leviér y attaché reçoivant un mouvement qui fait plonger la fourchette dans les vases remplís de mercure appartenant au second circuit, comme cela à lui pour le circuit ci-devant décrit. Cette operation comble immédiatement la lacune entre le première et le second circuit, et produit une force additionelle et nouvelle, ou un courant d'electricité ou de galvanisme, provenant de la batterie du second circuit, ce causant se direge vers les aimants placés à volonté sur un ou plusieurs points du dit circuit, dont la même opération peut-être repétié en etendant le courant sur un troissième ou quatrième circuit, ou en l'interrompant à volonté, on place alors autant de rapporteurs à des distances vouchues qu'on le desire, ils recoivent tous une action similtanée, cette disposition est representie, example 13 des dessins ci-joints.

Dictionaire ou vocabulaire.

Le dictionaire ou le vocabulaire se compose de mots arrangés alphabétiquement, numeratés regulièrement, et commencent par le letters de l'alphabet; de manière que chaque mot dans le langage dit son chiffre-telegraphic, et soit indique à volonté par des signes et des chiffres.

Des delateurs.

Les delateurs consistent en deux fils metalliques reunís d'une manière permanente par de la soudure, ou d'une manière temporaire ou moyen d'agraffes, avec les deux fils d'un circuit quelconque, sur un ou plusieurs points distants de la batterie electrique ou voltaique, exemple

12. Les deux autres bouts des dits fils sont réunís aux deux poles d'un electro-aimant; cet aimant est mis en communication au moyen de fils metalliques avec un circuit de conducteurs quelconques, et reçoit ainsi le courant de fluide electrique qui passe de la batterie par les conducteurs à moins qu'une lacune ou une interruption n'existe entre l'electro-aimant et la batterie; si l'aimant disposé comme il a été dit, se charge, c'est une preuve que les conducteurs sont en bon état dans toute la distance; si l'aimant ne se charge pas quand il est ainsi mis en communication avec des conducteurs, c'est une preuve qu'il y a interruption dans le circuit. En approchant graduellement l'aimant de la batterie, ou en examinant des aimants stationaires communiquant avec un circuit à des points de plus en plus rapprochés de la batterie, l'endroit précis d'une rupture ou d'un defaut dans les conducteurs serait aisement decouvert.

On jugera si les aimant sont ou non chargés par le fluide arrivant de la batterie, ou moyen d'une armature ou d'une petit morceau de fer doux aménè en contract avec l'un ou deux suspendu assez près de celui-ci pour recevoir l'action de l'aimant quand il est chargé de fluide electrique on voltaique.

Manière d' isoler et deposer les conducteurs.

On emploie à cet effet plusieurs procédés, on peut isoler les conducteurs en les entourant de soie, coton, chauvre ou lin, et les plongeant ensuite dans une solution de gomme lacque, ou dans de la poin ou de la resine et du caoutchouc. On peut les suspendre dans l'air, les faire circuler sur la terre, dans la terre, ou dans l'eau. Quand on les suspend dans l'air, on peut les isoler en les couvrant de manière à les pro é ger contre les injures du temps, avec du coton, du lin, du chauvre imprégné d'une solution non conductive. Les dits conducteurs sont suspendus de distance en distance sur despoteaux.

Quand on les place sur la terre, on les enferme dans les tubes de fer au de plomb, et ceux ci sont recouverts de bois, si on le juge nécessaire; quand *oisvent* les entouir dans la terre, on peut les entourer de tubes de fer, de plomb, de bois, au deporterie et les enlever.

Pour traverser les rivières, le circuit peut être dirígé sous le voutes ou les tabliers des ponts ou quand il n' y a pas de ponts, il peut traverser le fond du lit de la rivière, ou être suspendu d'une rive à l'autre, quand celles-ci sont escarpes.

Après avoir decrit en detail mes appareils et en avoir offert la representation dans les dessins ci-joints, je crois devoir resumer les caractères distinctifs de mon invention, et ceux sur les quels j'entends faire porter mon privilége exclusif.

Ils consistent:

1st. Dans la disposition et la combination des divèrses parties du mécanisme formant le composteur rectiligne, le porte composteur, le

composteur circulaire, le composteur à frottement, le leviér signal, le rapporteur et le carillon d' alarme, ainsi que le tout a été ci-devant décrit.

2. Dans la combinaison et l'adaptation du mécanisme constituant le rapporteur, les cylindre et rouleaux, qui l'accompagnent et les rouages qui le mettent au mouvement.

3. Dans l'emploi, la disposition, et l'arrangement des caractères pour établir la correspondence entre deux points distants au moyen de l'electro-magnetisme ou de fluide voltaique, et de conducteurs metalliques, combinés avce les mécanismes ci-devant decrits.

4. Dans la manière d'établir et d'interrompre mécaniquement des courants d' électricité ou de galvanisme dans tout circuit de conducteurs métalliques.

5. Dans la manière de diriger des courants d'électricité ou de galvanisme à travers un *un* nombre quelconque de circuits formés de conducteurs portant de générateurs des courants électriques ou galvanique.

6. Dans l' application d'electro-aimant ou moyen d' un ou de plusieurs circuits de conducteurs métalliques portant d'un générateur connu d' électricité ou de galvanisme, et communiquant avec les divers leviers du mécanisme décrit dans la specification précedente pour leur imprimer le mouvement et mettre en activité le mécanisme et correspondre par des signes et des sons entre des points eloignés et simultanement à plusieurs points éloignés.

7. Dans le mode et le procéde pour consigner d'une manière permanente la trace de signes transmis entre deux points éloignés et simultanement à des points differents par l'application et l'emploi de l'electro-magnetisme ou du galvanisme comme il a été decrit.

8. Dans la combinaison et l'arrangement d'electro-aimans dans un ou plusieurs circuits de conducteurs métalliques avec des armatures, pour transmettre une correspondence soit par des signes, soit par des sons, soit par ces deux moyens à la fois entre des points éloignés et à des points differents simultanement.

9. La manière de decouvrir les lacunes ou les defaults dans les circuits de conducteurs métalliques au moyen de fils metalliques et d'electro-aimans qui forment les appareils que j'appelle delateurs.

10. La manière ou le procéde pour mettre en mouvement et arréter à volonté le rapporteur et les rouages qui en dependent sans qu'on soit obligé d'y porter la main, ainsi qu'il a été ci-devant decrit.

11. La combinaison et l'adaptation des diverses partiés du mecanisme et du systême de caractéres et des signes avec un dictionnaire ou vocabulaire de mots, ainsi qu'il est decrit dans la présente specification.

Fait à Paris le 18 Août, 1838.

Signé PERPIGNA.

Pour le ministre secrétaire d'etat, des traveux publics, de l'agriculture et du commerce, et par delegation.

Le maitre des requêtes, secrétaire général.

Signé J. BOULAY.

Pour expedition conforme,le maitre des requêtes, secrétaire général.
J. BOULAY.

Affidavit of Richard C. Morse.

The following are the affidavits read by the complainants:

Personally appeared before me, Wm. V. Brady, on the 23d day of March, 1848, the subscriber, Richard C. Morse, who being duly sworn deposeth and saith, that Samuel F. B. Morse, the inventor of the electro-magnetic telegraph, is his, deponent's, eldest brother; that on the 15th day of November, 1832, deponent, in company with his other brother, Sidney E. Morse, went to the North river, near the foot of Rector street, in the city of New York, where the packet ship Sully, Capt. Wm. Pell, had just moored on her arrival from Havre, having on board as passenger the said Samuel F. B. Morse, returning home from a three years' residence in Europe; that hardly had the usual greetings passed between us three brothers, and while on our way to deponent's house, then No. 270, East Broadway, the said S. F. B. Morse informed us that he had made during his voyage an important invention, which had occupied almost all his attention on ship-board, one that would astonish the world, and of the success of which he was perfectly sanguine. That this invention was a means of communicating intelligence by electricity, so that a message could be written down in a permanent manner by characters at any distance; and the said S. F. B. Morse took from his pocket and showed us his sketch book, in which he had drawn the kind of characters which he proposed to use; and that these characters were dots and spaces representing the ten digits or numerals.

This deponent well remembers his surprise and delight at the announcement of this brilliant invention. The subject of this Electric Telegraph (the name by which said S. F. B. Morse called his invention) was daily conversed about in the family for weeks. For deponent further saith, that said S. F. B. Morse took up his residence for many weeks at deponent's house; and that as soon as said S. F. B. Morse had removed his baggage from the ship he began the construction of his telegraph; that he used a mould in which to cast the type for the characters, or dots and spaces, which he had invented, and had shown to deponent in his sketch book. This mould was of brass, side and top, and a brass slide for the bottom upon which the numbers were stamped, from 1 to 0, and which could be easily adjusted so as to bring any desired number into the mould that it might be cast upon the type to which it corresponded. These type were thin strips of type metal about the thickness of a dollar, having cogs or teeth arranged in a particular manner. This deponent further saith, that the mould was used by the said S. F. B. Morse for casting said type at the deponent's house aforesaid, previous to January, 1833; he, the said S. F. B. Morse, melting his type metal at the front parlor grate of No. 270, East Broadway. Deponent further saith, that a considerable number of said type

were then cast of each of the numerals, and that one of deponent's chairs and a piece of drugget before the grate were injured by the dropping of the melted lead upon them, by the said S. F. B. Morse, in the process of casting his type. This deponent further saith, that in subsequent conversations, between his two brothers, on the subject of the telegraph, he distinctly remembers that a difference of opinion existed between them in regard to the number of circuits thought to be necessary for a practicable telegraph; the said S. F. B. Morse contending that to have more than a single circuit was not reducing the invention to its necessary and proper simplicity; while the said Sidney E. Morse contended for as many circuits as there are letters in the alphabet. The deponent remembers that he sided with said Sidney E. Morse in opinion, and that he was at a loss to conceive why said S. F. B. Morse should lay so much stress as he did upon having but a single circuit, unless it were to save expense; a motive which seemed to deponent wholly unworthy of consideration, in view of the vast benefits to be secured by the invention. And further deponent saith not.

RICHARD C. MORSE.

Sworn before me this 23d day of March, 1848.

WM. V. BRADY,
Mayor of the city of New York.

Affidavit of S. L. Morse.

Personally appeared before me, William V. Brady, mayor of the city of New York, on the 23d day of March, 1848, the subscriber, Sarah Louisa Morse, who deposeth and saith, that she is the wife of Richard C. Morse, a brother of Samuel F. B. Morse; that they, the said Richard C. and Sarah Louisa Morse, rented and resided in the house No. 270, East Broadway, in the city of New York, in the year 1832; that she well remembers the time of the arrival of her brother-in-law, Samuel F. B. Morse, from France, in the month of November, 1832, and that said S. F. B. Morse resided for several months at their house. This deponent further saith, that she distinctly recollects that the said S. F. B. Morse was engaged, immediately after his coming to the house, in casting, with lead or other metal, certain pieces which he called type, and which she understood were to be used, in some way not understood by her, for an electric or galvanic telegraph, which the said S. F. B. Morse said he had invented on board the ship during his passage home; that the said S. F. B. Morse melted the metal which he was using over the fire in the grate of her front parlor, and that she distinctly recollects that, in his operation of casting, he accidentally spilled some of the metal upon the drugget or loose carpeting before the fire place, and also upon a flag bottomed chair, on which his mould was placed; and further that this drugget was seen for many years afterwards for various uses about the house. And further deponent saith not.

SARAH LOUISA MORSE.

Sworn before me this 23d day of March, 1848.

WM. V. BRADY, *Mayor.*

Affidavit of L. D. Gale.

SAMUEL F. B. MORSE and others,
vs.
HENRY O'RIELLY and others.

Affidavit of Leonard D. Gale, of Washington, D. C., one of the chief examiners in the Patent office of the United States.

To Professor LEONARD D. GALE,
Chief examiner in the Patent office.

Will you be pleased to reply, by affidavit, intended for immediate use, in sustaining and vindicating, judicially, Professor S. F. B. Morse's patents for the American Electro-magnetic Telegraph, to the following several questions, *following*, viz:

1. Do you consider the essence of Morse's patents to be for a machine, or for machinery only, or for a principle carried into practice? If the latter, what is that principle, and in which of his claims in his original patents, and the re-issues, (referring to them severally) is that principle embodied?

2. Is it usual to grant patents for a principle carried into practice; and if so, what relation to the main object does the machinery bear which is described in the patent, and made use of to give the principle practical effect?

3. When an embodied principle constitutes the essence of a patent, is it the practice of the Patent office to grant patents to other inventors of systems of machinery, different from that described in such patent, for the purpose of enabling other inventors to arrive at the same result? If so, are such patents granted as for original inventions, or for improvements; and is it considered that they can be lawfully used without license from the prior patentee, who through another set of machinery has already secured the principle?

4. Are not Morse's patents considered as securing to him not only a principle, but also certain original machinery and combinations of machinery, and a telegraphic alphabet? If so, please describe the original machinery and combinations of machinery, as well as the alphabet so secured, referring to the claims in the original patents, and each of the reissues in which they are designated.

5. In a patent reissued after the surrender of the original, can any new claim, not fairly deducible from the facts and principles stated in the original patent, be introduced? On the other hand, if it shall be discovered in the mean time that the patentee was not entitled to anything claimed in his original patent, will it not be refused to him in the reissue?

6. Have you not made electricity and electro-magnetism to a great extent your study; and have you not read all or most of the publications describing the process of that science, and its application to telegraphic purposes, at home and abroad? If so, do you now know of any fact which could impair Prof. Morse's right to all he claims in his

patents if they were now for the first time submitted for your examination?

7. Are you not familiar with the origin and progress of most of the plans for electric and magnetic telegraphs which have been invented and patented in Europe, particularly with Wheatstone's, Davy's, and Steinheil's? When does it appear that descriptions of each of those inventions were first published? Did either of them ever mark down telegraphic signs by indentation, or use or describe a telegraphic alphabet like Professor Morse's?

8. Does it appear that Davy's or Steinheil's plans were ever reduced to practice, otherwise than experimentally, or are now in use at all? To your knowledge, is any telegraph now used in Europe which writes or imprints telegraphic characters by means of electro-magnetism like Prof. Morse's?

9. Were you ever, or are you now, interested in Morse's American Electro-magnetic Telegraph?

AMOS KENDALL,
Agent for S. F. B. Morse and Alfred Vail.

August 7th, 1848.

Reply in affidavit of L. D. Gale, one of the examiners in the United [States] Patent office, to certain questions put by the Hon. Amos Kendall, as hereto prefixed this 11th August, 1848.

1. Reply to question 1.

I consider the essence or spirit of the invention patented by Samuel F. B. Morse, and referred to in the question aforesaid, to consist in a principle carried out in practice. To the question, what is a principle, and in which of his claims in his original and reissued patents is the principle embodied, I reply:

A. First. That the term principle, as used here, cannot be used abstractly, but must be considered in connexion with a result, an end, or a practical application. Neither principle by itself, nor result by itself, is the proper subject of letters patent.

In general, letters patent are granted for the means used in obtaining a result. But when an individual opens a new field of inquiry and investigation, and shows by adequate means (the apparatus used) the subjection of any of the principles or powers of nature not hitherto subjected to such purposes, and thus obtains a result, it has been the practice of the office to give him who opens the field the benefit of the first harvest, by grant of letters patent, covering the ground by such means as he had used to obtain the result, or by any other means.

In the patent granted to Prof. Morse, on the 20th June, 1840, I consider the essence of the invention to be mainly embraced in the 6th claim. Parts of the same are further detailed in claims 7 and 8. In the first reissue of the patent of 1840, dated 15 January, 1846, the

spirit of the invention is embraced in the first claim. In the 2d reissue, dated 13th June, 1848, it is contained in the first and last claims.

2. Reply to the question 2d.

For reply to this, see explanation of the term principle, in bracket A, on the last page; and, further, when a patent is granted for a principle carried out in practice, the relation of the machinery to the main result is an important one. First, it shows how the result is obtained, and illustrates its practicability. Secondly, the machinery itself is also a proper subject of letters patent.

3. Reply to question 3d.

It is the practice of the office, notwithstanding an applicant has been allowed to claim the broad ground of a principle which he was the first to apply or reduce to practice, and such machinery as he may have invented for that purpose, to grant patents to other inventors who may have devised other machinery designed for the same purpose as that of the original inventor. But the inventions of him who succeeds the original are generally denominated an improvement, but not always so. In all cases, however, while the original continues to hold his right to cover the ground of a principle applied to practice, all other inventions of machinery, applying the same principle or power to reach the same result, may, if patentable, be secured to the inventors thereof; but in no such case can the second inventor or improver use his own invention without the permission of the original inventor, nor can the latter use the invention of the improver without his (the improver's) consent.

4. Reply to the 4th question.

Morse's patent, inasmuch as he was the first to introduce machinery of any kind to mark or print permanent signals of whatever kind, at distances for telegraphic purposes, I consider entitle him to the use of electricity or magnetism, (both being considered by scientific men as of common origin,) as a motive power for the telegraphic recording of signals, and to all the machinery he has invented and described, and to his telegraphic alphabet. Most of the machinery used in the earlier history of the invention, was described in Morse's patent of 20th June, 1840, and referred to in the claims of said patent, under different names.

1. Type rule.
2. Recording cylinder.
3. Type.
4. Circuit breaker, or bascule.
6. Electro-magnets, and levers moved by them.
8. Applications of electro-magnets, in one or more circuits, for transmitted intelligence. But, previous to any patent being granted, and so far back as the winter of 1836–'7, other apparatus was used besides that above referred to. In example, type were used to form and break the connexion with the circuit, and were contained in a groove in the edge of a flat wooden rod, called port rule. This was carried through the machine by turning a crank connected with an endless belt over which the type were propelled; all of which apparatus is described, in

Vail's book, called the American Electro-magnetic Telegraph, and is also further described by me in a separate affidavit. The alphabet of Morse consists of horizontal dashes, dots, and spaces. I am informed that, originally, the alphabet, which was invented previous to 1836, consisted only of dots and spaces; but in the winter of 1836, when I first became acquainted and familiar with the invention, the alphabet consisted of dots, horizontal dashes, and spaces. According to the best of my knowledge and belief, the alphabet was invented by himself, and certainly before the winter of 1836–'37. The dash was an element of it in his caveat, filed in the office in October, 1837. It then consisted of the same elements, namely, dots, dashes, and spaces, as it now does, and arranged pretty much as it now is. The alphabet was not claimed in the first patent, although described both in it and in the caveat; but, on the first reissue, on the 15th January, 1846, it was claimed, and forms the 2d claim. In the second reissue, dated 13th June, 1848, it contributes the basis of the 5th and 6th claims.

5. Reply to the question 5, namely:

On surrendering a patent for reissue, the claims are all examined with great care; and if by any means it be found that the alleged invention was not new when granted originally, it is denied him on the reissue; if, on the contrary, it be ascertained that the patentee did not claim in the original all he had described that was really new and original, he is permitted to claim, in the reissue, all the ground not so claimed or covered at first. Such is the uniform practice of the office. But no new claim to invention, not expressed or implied in the original, is admitted in the reissue.

6. Reply to question 6, namely:

I have made electricity and electro-magnetism the subject of study for many years, and am familiar with the progress of the science and its application to telegraphic purposes, here and elsewhere; and I know of nothing to impair the right of Prof. Morse to the claims he has, as expressed in his several patents. I have no doubt that all his claims are legal and just.

7. Reply to the question 7, namely:

I am acquainted with the origin and progress of most of the electric and magnetic telegraphs which have been invented and patented in Europe, as Wheatstone's, Davy's, Steinheil's, &c.

Wheatstone & Cook's invention seems to have [been] published by the patentees, through Mr. P. S. Hodson, of No. 15, Cross street, Hatton Gardon, London, in 1839. See Vail's Elec. Mag. Telegraph, p. 171. But the letters patent were not sealed for the same invention until the 21st January, 1840. The enrolment was not made until six months afterwards, or till the 21st July, 1840. See London Journal of the Arts and Sciences, conjoined series, vol. 15, p. 396.

Davy's invention was sealed as an application for letters patent on the 4th of July, 1838, and enrolled on the 4th January, 1839. It will be remembered that the steps for obtaining a patent in England are different from those pursued in America. In the former case, the patent

is, at a certain step of the process, said to be sealed; from this time the applicant has six months allowed him to specify and describe what his invention is before it is published, or, as it is technically called, enrolled.

The invention of Steinheil was first made known to the public, as this affiant believes, at the session of the French Academy of Sciences, Sept. 10, 1838, by a communication from the inventor himself.

It is a fact worthy of remark, that at the same session of the academy in which Morse exhibited, in person, his telegraph in operation, M. Arago read Prof. Steinheil's communication, containing the first public account of his telegraph. The 10th Sept., 1838, therefore, according to the laws of date in discoveries and inventions, recognised by men of science throughout the world, is the date that must be fixed for Steinheil's invention.

Neither Davy, Wheatstone, nor Steinheil made permanent records by indentation, on any surface or fabric; their instruments belonged to that denomination called needle telegraphs, the signs of which are evanescent. None of the three used or described an alphabet like Morse's. Steinheil's alphabet is correctly described in Vail's American Telegraph, p.182, and consists of dots arranged in a particular way.

8. Reply to question 8. It does not appear that either Steinheil's or Davy's telegraph was ever brought into public use, except as a matter of experiment. To the best of my knowledge, there is no telegraph in Europe that writes or prints telegraphic characters by means of electro-magnetism like Prof. Morse's.

9. Reply to question 9. I was once interested in Morse's American Electro-magnetic Telegraph; I disposed of my interest in it soon after entering upon my duties as assistant examiner in the Patent office, namely, on the 2d of February, 1847. See Patent office record, transfer of patent rights, G 1, 1847.

At the request of Mr. Kendall I have carefully compared the drawings annexed to Prof. Morse's first patent with the references in his caveat of 1837, and find them to correspond, with the following exceptions, viz:

The type consisting of twelve different pieces, for which reference is made in the caveat to example 3 of the drawings filed therewith, are found, in example 4, attached to the patent of 1840.

In the caveat the rule, meaning the type rule, is represented as in example 4 in the caveat drawings, but is found in example 7 of the patent drawings.

In describing the system of signs an example of compound numerals is given in the caveat composed of the numbers 324 and 516, and represented as set forth in the drawings, fig. 1, example 2. No such arrangement of numbers appears in the patent drawings. These variances are immaterial, and with the exception of the last sheet, appear to be substantially the same as those referred to in the specification of the caveat.

L. D. GALE.

DISTRICT OF COLUMBIA,
County of Washington, sc:

Personally appeared before me, T. Hartley Crawford, judge of the criminal court of the District of Columbia, being a court of law and record, on [the] twelfth day of August, in the year of our Lord eighteen hundred and forty-eight, Leonard. D. Gale, who being duly sworn according to law, on the holy evangely of Almighty God, doth depose and say, that the contents of the foregoing written affidavit are just and true, to the best of his knowledge and belief.

In testimony whereof I hereto set my name.

T. HARTLEY CRAWFORD.

DISTRICT OF COLUMBIA,
County of Washington, sct:

I, William Brent, clerk of the criminal court of the District of Columbia, for the county of Washington, do hereby certify, that the Hon. T. Hartley Crawford, before whom the foregoing and annexed affidavit appears to have been made, and who has thereto subscribed his name, was, at the time of so doing, judge of the said criminal court, duly commissioned and qualified.

In testimony whereof I have hereto subscribed my name, and af-
[L. S.] fixed the public seal of said court this 12th August, 1848.

WM. BRENT, *Clerk.*

Affidavit—C. G. Page.

SAMUEL F. B. MORSE and others
vs.
HENRY O'RIELLY and others.

Affidavit of Charles G. Page, of Washington, D. C., one of the chief examiners in the Patent office of the United States:

To Professor CHARLES G. PAGE,
Chief examiner in the Patent office.

Will you be pleased to reply, by affidavit, intended for immediate use in sustaining and vindicating, judicially, Prof. S. F. B. Morse's patents for the American Electro-magnetic Telegraph, to the several questions following, viz:

1. Do you consider the essence of Morse's patents to be for a machine or machinery only, or for a principle carried into practice? If the latter, what is that principle, and in which of his claims, in his original patents and the reissues (referring to them severally,) is that principle embodied?

2. Is it usual to grant patents for a principle carried into practice? And if so, what relation to the main object does the machinery bear which is described in the patent and made use of to give the principle practical effect?

3. When an embodied principle constitutes the essence of a patent

is it the practice of the Patent office to grant patents to other inventors for systems of machinery different from that described in such patents, for the purpose of enabling other inventors to arrive at the same result; if so, are such patents granted as for original inventions, or for improvements, and is it considered that they can be lawfully used without license from the prior patentee, who, through another set of machinery, has already reserved the principle?

4. Are not Morse's patents considered as securing to him not only a principle, but also certain original machinery and combinations of machinery, and a telegraphic alphabet? If so, please describe the original machinery and combinations of a machinery, as well as the alphabet, so secured, referring to the claims in the original patents, and each of the reissues in which they are designated.

5th. In a patent reissued after surrender of the original, can any new claim not fairly deducible from the facts and principles stated in the original patent, be introduced? On the other hand, if it shall be discovered in the mean time that the patentee was not entitled to any thing claimed in his original patent, will it not be refused to him in the reissue?

6th. Have you not made electricity and electro-magnetism to a great extent your study; and have you not read all or most of the publications describing the progress of that science, and its application to telegraphic purposes at home and abroad? If so, do you know any fact which could impair Professor Morse's right to all he claims in his patents, if they were now, for the first time, submitted for your examination?

7th. Are you not familiar with the origin and progress of most of the plans for electric and magnetic telegraphs which have been invented and patented in Europe, particularly with Wheatstone's, Davy's, and Steinheil's? When does it appear that descriptions of each of those inventions were first published? Did either of them ever mark down telegraphic signs by indentation, or use, or describe a telegraphic alphabet like Prof. Morse's? Does it appear that Davy's or Steinheil's plans were ever reduced to practice, otherwise than experimentally, or are now in use at all? To your knowledge, is any telegraph now in use in Europe which writes or imprints telegraphic characters by means of electro-magnetism like Prof. Morse?

8th. Were you ever, or are you now, interested in Prof. Morse's telegraph?

AMOS KENDALL, Agent for
S. F. B. MORSE &
A. VAIL.

August 7, 1848.

Reply of Charles G. Page to the interrogatories hereto prefixed, viz:

The patents granted to Samuel F. B. Morse, for certain improvements in telegraphs, embrace claims to general principles of operation, as well as special means or machinery for operating, prior to the reissue

of letters patent to said Morse for the invention patented by him June 20, 1840, and for which he entered in the Patent office a caveat, October 6, 1837, and a duly completed application April 9, 1838; it could not be found that any telegraph, of any description, had ever recorded signs prior to the invention and discovery of said Morse, and the patent was accordingly granted to him for the use of the motive power of magnetism, for imprinting signals for telegraphic communication. The essence of this invention I consider to be recording or imprinting signals in a permanent manner upon any suitable material, by means of the electro-magnetic power in whatever way it can be called into action, whether by means of the ordinary electro-magnet, which the said Morse was the first to use for this purpose, or by any of the inferior electro-magnetic contrivances for this purpose, such as bars of iron or of steel moving within coils of wire, or moved by means of coils of wire, to which the bars are exterior, whether these bars be magnetized or unmagnetized.

The power called into action in all these cases is one and the same. It is the electro-magnetic power, or a mutual or reciprocal action between electricity and magnetism. To the best of my knowledge, all telegraphs prior to that of said Morse made evanescent signals merely, and if not inspected at the time of communication were of no use. They left no record of the intelligence transmitted. Said Morse was not the first to suggest or employ the electro-magnetic power for communicating signals, but to the best of my belief and knowledge was the first to suggest and employ that power for recording signals, and to exhibit a successful invention for that purpose. This, then, constitutes what is considered by the Patent office a patentable principle. It must have been known to said Morse when he first applied this power to record signals, that this same power developed, in any way whatever, would answer his purpose of recording. To record his signals at a distance, he wanted to produce a motion at a distance, and for this purpose he employed electro-magnetic motion. Here is a prominent feature, a discovery of a general principle, which is involved in all recording or printing electro-magnetic telegraphs, whether more or less machinery be employed, or set in motion by the electro-magnetic power to effect the recording or printing.

It is a principle of patent law, that when an inventor has discovered means of producing an entirely new result, and shows a successful and practicable mode of producing that result, he may claim the result however produced, and claim also his own special mode. The inventor, said Morse, has not, however, claimed the result in this case, viz., the result of recording at a distance, which he was the first to accomplish, but has limited his claim to the production of that result by means of the electro-magnetic power however employed. A similar rule applies to principles where new principles are discovered, and new modes of carrying them into effect. Thus, it is laid down, that you "cannot take out a patent for a principle, but you may take out a patent for a principle coupled with the mode of carrying the principle into

effect, provided you have not only discovered the principle, but invented some mode of carrying it into effect; but then you must start with having invented some mode of carrying the principle into effect; if you have done that, then you are entitled to protect yourself from all other modes of carrying the same principle into effect, that being treated by a jury as piracy." This view of the case is thus stated by Baron Alderson, in case Jupe vs. Pratt, Patent Reports, 151; and the same important doctrine was laid down by Lord Pentenden, chief justice, in Lewis and another vs. Davis, 3 Car. and P., 502; and is so cited in Webster's Law and Practice of Letters Patent for Inventions, London, 1841, page 17 of appendix.

Patents are granted in such cases for new and improved modes of effecting such results, but the patentee of the improvement cannot use his improvement without liability to the patentee of the general principle or result; nor can the latter use the improvement without liability to the patentee thereof. For instance, working steam expansively was an important discovery, which might have been made out by deduction or calculation. An inventor who had arrived at this result, and showed a practicable mode of carrying out the result, would be entitled to a patent for working steam expansively, whether the steam was cut-off at half-stroke, three-quarters stroke, or at any other time. A new cut-off for this purpose would be patentable, but could not be used without liability to the patentee of the general principle; that is, of working *of working* steam expansively.

The patent of said Morse is also for means of recording, the same consisting of the electro-magnet and machinery set in motion by it. While the said patent gives to said Morse the broad ground of the right to use electro-magnetic power or motion for recording signals at a distance, it also secures to him the right to use the electro-magnet in such connexion, and the machinery actuated by it, for this purpose.

The particular features making the special part of the patent are enumerated in his claims.

The patent of said Morse also secures to him the right to use a system of alphabetical signs, consisting of dots and spaces, and dots, spaces, and horizontal lines. Upon careful investigation it did not appear that these signs had ever before been used as an alphabet of language, and the patent was accordingly granted. It is evident that the signs will admit of a great variety of transpositions, without changing the character of the invention, which consists in using such signs for telegraphic purposes, under any arrangement whatever.

In the patent of said Morse, originally dated 11th April, 1846, and reissued 13th June, 1848, another principle or general feature is secured, as well as special matter.

The invention therein specified as a receiving magnet is an electro-magnet, used as an intermediate magnet, or auxiliary to that magnet which performs the recording.

As the recording or register magnet, as it is called, must possess considerable power, it would require a very large galvanic battery to obtain

power sufficient through long lines of telegraph. To obviate this difficulty said Morse invented this receiving magnet. He introduced into the main galvanic circuit of telegraphic wire an electro-magnet, whose motions, though comparatively feeble, were made to give motion to the register or recording magnet. The motions of the receiving magnet were used to establish and regulate the connexion of the register magnet with the local battery, by which means a small galvanic battery was brought into play, and rendered sufficiently powerful the register magnet for the purpose of recording, thus saving a considerable expense. It was obvious that any known electro-magnetic movement that could be effected through the long or main line of wire, would answer the purpose of this intermediate or receiving magnet. A motion, however feeble, was all that was necessary, and however the form or character of the electro-magnetic contrivance might be carried, its functions must be the same, and the whole purpose of the invention must be accomplished by it.

New forms of electro-magnets might be invented, but no species of electro-motion could be used in such a connexion, for such a purpose, without liability to said Morse, as patentee.

In cases of the surrender of patents for reissue, the claims are all carefully examined, and if any claim is found to have been originally granted improperly, it is refused on the reissue. It has been decided by Justice Thompson that, on a reissue, "the claims may be enlarged, but not so as to be broader than the original invention." This is the rule of practice in the Patent office.

I have made the subjects of electricity and magnetism a special study for more than twelve years, and knew of nothing before the issue of said letters patent to said Morse which could have interfered with his claims, nor has any fact come to my knowledge since the grant of said letters patent which would, in my judgment, in any way impair his rights, as secured to him under said patents.

I am familiar with the origin and progress of the electric and electro-magnetic telegraphs, and have never known of one that marked signs by indentations, after the manner of said Morse's invention; and, to the best of my belief and knowledge, the telegraphs of Steinheil, erected in 1837, of Prof. Wheatstone, invented in 1837, and of Edward Davy, patented in England, 4th July, 1838, have been found impracticable, and are not now in use.

I have not now, nor ever had, any interest in any of the patents granted to said Morse.

CHAS. G. PAGE.

DISTRICT OF COLUMBIA,
County of Washington, ss:

Personally appeared before me, T. Hartley Crawford, judge of the criminal court for the District of Columbia, being a court of law and record, on the twelfth day of August, in the year of our Lord eighteen

hundred and thirty-eight, Charles G. Page, who, being duly sworn according to law on the holy evangely of Almighty God, doth depose and say, that the contents of the foregoing written affidavit are just and true, to the best of his knowledge and belief.

In testimony whereof I have hereunto set my name.

T. HARTLEY CRAWFORD.

DISTRICT OF COLUMBIA,
County of Washington, sct.

I, William Brent, clerk of the criminal court of the District of Columbia, for the county of Washington, do hereby certify, that the honorable T. Hartley Crawford, before whom the aforegoing and annexed affidavit appears to have been made, and who has thereto subscribed his name, was, at the time of so doing, judge of the said criminal court, duly commissioned and qualified.

In testimony whereof I have hereto subscribed my name and affixed the public seal of said court, this 12th of August, 1848.

[L. S.]

WM. BRENT, *Clerk.*

Affidavit of Jas. S. Foss.

S. F. B. MORSE and others
vs.
HENRY O'RIELLY, and others.

In equity, in the circuit court of the United States, for the district of Kentucky.

The affidavit of James F. Foss.

This affiant states, that he is a citizen of the State of New York, and a resident of the city of New York; is 29 years old; that for the last two and a half years he has been engaged in, and connected with, Morse's Electro-magnetic Telegraph.

That he is familiar with the whole of the said invention and its improvements, as patented to Samuel F. B. Morse, having been engaged for the above length of time in operating on said Morse's telegraph lines.

That he left New York city on the 5th day of February, 1848, to take the superintendence of the New Orleans and Ohio Telegraph Company's line, and that his business in traversing said line has afforded him an opportunity of becoming familiar with the operations of Henry O'Rielly in constructing the "People's line" of telegraph from Louisville, Kentucky, to New Orleans, Louisiana.

That the said Henry O'Rielly has constructed a line of magnetic telegraph from Louisville, Kentucky, to Nashville and Memphis, Tennessee, which is being constructed and extended to New Orleans, La.

Said line is constructed by the erection of posts and the stretching of a line of iron wire thereon from Louisville, Kentucky, through the towns

of Bardstown, New Haven, Glasgow, and Scottsville, Kentucky, and Gallatin and Nashville, Tennessee.

That the said line of telegraph is now, and for some time has been, in operation and transacting telegraphic business for compensation. That the said "People's line" starts from an office in Louisville, Kentucky, in which office are employed Mr. E. L. Witman as operator, and Mr. W. F. B. Hastings as clerk.

This affiant frequently visited said office and witnessed the operations in the same, and he does verily believe that he does fully and rightly understand the apparatus and machinery used therein for telegraphic purposes, and the transmission and reception of intelligence; the same which is called the "New Columbian Telegraph," and claimed to be the invention of Messrs. Barnes and Zook.

The following is according to the best of his observation and belief a correct description of the instrument used in said office, called the "Columbian Telegraph," or of all the essential parts thereof, viz:

In the accompanying drawings, fig. 1 represents an end view of the receiver which consists of an upright brass frame A, fig. 1, and AA, fig. 2, fixed into a cross piece B, fig. 1 and 2, for the purpose of securing it to the table. Upon the upright A are fastened eight helices marked on one side 1, 2, 3, and 4, in fig. 1, and on the other side of the upright A are those marked 5, 6, 7, and 8.

Fig. 2 is a side view of the same instrument, and the corresponding helices marked 1, 2, 3, and 4 in fig. 1, are similarly marked in fig. 2. The remaining helices 5, 6, 7, and 8, are directly behind those marked 1, 2, 3, and 4, and are therefore hid.

These helices are all connected together, and are in the circuit of the main wire. J represents one end of the main wire connected with the clamp screw h, and proceeds from thence to f, and to the helix 4; thence to helix 3; thence to helix 2; and thence to helix 1; thence to the helix behind marked 5, in fig. 1; thence to helix 6; thence to helix 7; thence to helix 8, leaving the last helix it passes at g to the clamp screw i; and thence to k, the other end of the main wire. Between the four helices on one side of the upright frame A, and the four helices on the other side of the frame, and also about half way between the extremities of these eight helices, there is an upright spindle or shaft S S S, whose upper axis is at H. A screw in the top part of the receiver frame AA, and whose lower axis or pivot rests in the metallic foot I. At four places on this vertical shaft or spindle are secured 8 steel needles permanently magnetized, two being in the same plane with each other, and at angles to each other on the shaft at less than right angles; and these four double needles correspond in their places on the shaft with the opening in the helices so that their extremities may move in and out of the openings when affected by the galvanic current in the helices. These four double needles are represented at L, M, N, and O, fig. 2, on the vertical spindle S S S. On the spindle at m, is fastened an arm projecting back, and to the end is fastened one end of the spiral spring n; the other end of this spring, n, is so secured to the adjusting

screw o, that its elasticity is increased or diminished by turning the screw o to the right or left. The object of this arm, spring, and screw is to cause the needles to resume their place when not acted upon by the galvanic current through the helices.

Now, if the galvanic current is sent through or along the wires of these helices in the proper direction, the needles move in the helices in a direction in obedience to known laws depending upon the mode of winding the helices, the polarity of the needles, and the direction of the current in the main line; and if the current is broken, or the circuit opened, the needles will resume that position which is effected by the arm m, spring n, and screw o, and the stop or the connecting screw q. On the same shaft, or spindle SSS, at p, is a metallic arm fastened, and upon its end a platina or other metallic cross piece in a line with the screws p and q, viz., one end of this cross piece, p, is in the same plane with the adjusting screw or stop q, and the other end in the same plane with the screw p, so that the cross piece p moves to the left [when] it comes in contact with the screw q, and if it moves to the right in contact with the screw r.

Having described the parts of this instrument, its movement is as follows:

If the current is made to pass through these helices in the proper direction the needles move, and with them the arm and cross piece p, on the spindle SSS, will move so as to come in contact with the screw r. If the current is broken, then the cross piece, in obedience to the power of the spring n, will move reversely until it comes in contact with the screw q, and is stopped; and as often as the circuit is closed, when the current is in the proper direction, the arm will move to the right, and when broken to the left.

Figs. 5 and 6 represent two permanent steel magnets D and C, made of three separate horse-shoe formed magnets, each seen in a top view in fig. 6, and a side view in fig. 5.

In fig. 6 their north and south poles are marked n and s—n and s. These two magnets lie in the same horizontal plane with the south pole of one magnet near the north pole of the other magnet, but so far are these poles separated from each other as to admit an electro-magnet EE′ freely between them, and of sufficient power to effect the purposes designed, and hereafter to be described.

This electro-magnet EE′ is either a round or square bar of soft iron, of the same material as that used in the construction of Morse's electro-magnets, and like Morse's electro-magnets surrounded by metallic insulated wire, as seen at K, fig. 5, and at KK, fig. 6. The two ends of the helix surrounding the soft iron keeper or armature EE′, are seen at a b, fig. 6.

This electro-magnet is fastened to a vertical arm, f, fig. 5, and the arm is hung upon a horizontal spindle, or centre g, so as to allow the electro-magnet to oscillate or vibrate between the two permanent magnets D and C. From this same spindle or centre, G, proceeds and is fast with the vertical arm F, another arm K, called the pen lever, of

the same kind as that used in Morse's instruments, and for the same purpose. Upon the extremity of this horizontal arm K is its pen point T, for marking indentations or marks upon the paper.

S and R represent the rollers which, moved by ordinary clock work, draw the paper U and V along, as is done by Morse's instruments.

There is no difference between Barnes and Zook's and Prof. Morse's instruments in reference to the pen lever, pen point, mode of moving the paper along, and the character of the marks upon the paper.

Now, if the end of the wire b is put in the positive pole of a battery, and the wire a put in the negative pole, the effect is to produce electro-magnetism in the bar of soft iron EE′. E becomes the north pole, and E′ the south pole. Since like poles repel each other, and unlike attract each other, it follows that the electro-magnet EE′ will be attracted to the magnet DD, and recede from the magnet CC, fig. 6.

If the current is reversed through the helix kk by reversing the poles a and b, or by any mechanical contrivance, another reverse battery is thrown in the circuit, while the first battery is thrown out; then the electro-magnet EE′ will be drawn to the magnet CC, and recede from the magnet DD.

To effect this change of current in the local circuit two local batteries are used. Prof. Morse uses but one local battery. Figs. 3 and 4 represent the local batteries essentially like those used by Prof. Morse. By tracing the wires the proper connexions of these instruments will be understood. Wire 11, fig. 4, from the positive pole of the local battery, is connected with the screw r, at 15, fig. 2; and the wire 12, of the negative pole of the same battery, is connected with the helix k, at 13 of fig. 5. The wire 10 of the negative pole of the local battery, fig. 3, is connected with the screw q, at 14; and the wire q of positive pole of the same battery with the helix k, at 13 of fig. 5. These two wires from q, 12, both terminate in one wire, which is 13, of the helix k, of fig. 5. The other wire of the helix k, fig. 5, is connected with the foot I, of the spindle of the receiver. Having described the parts of their plan, its mode of operation is as follows:

Supposing the instrument to be receiving messages—a current is made to pass through the main line from the distant station, by closing the circuit at that end (there being a battery in the main circuit.)

The current passes through the 8 helices (or more, if more are used) of the receiver, causing the needles to move in the direction to carry the cross piece p, fig. 2, in contact with the screw r. This contact closes the circuit of the local battery, fig. 4. The circuit being as follows: from 11 to 15 and to the screw r, from the screw to the cross piece p, along the arm to the spindle S, down the spindle to the foot I, and along the wire to 14, through the helix k to 13, along the wire to 12, the negative pole of the local battery, fig. 4, and the soft iron EE′ becomes an electro-magnet.

Then if the permanent magnets are as shown in fig. 6, E end of the electro-magnet becomes south, and E′ becomes north, and is attracted to the D magnet, which produces in the pen lever K an upward

movement, and brings the pen point against the paper, passing under the roller R, and between the rollers R and S.

If now the circuit is broken at the distant station, the cross piece p, by virtue of the spring n, is carried in contact with the screw q, fig. 2, and the local battery, fig. 3, is brought into action reversing the magnetism in the electro-magnet EE′, and making E end of the soft iron north, and E′ end south, consequently the electro-magnet EE′ is attracted to the CC permanent magnet, which causes the pen lever K and pen point T to recede from the paper, passing under the roller R. This operation of the pen lever and point, and the marks upon the paper, are precisely what is produced by the operation of Morse's instruments.

This affiant states, that the foregoing description of the "Columbian Telegraph" he knows to be correct in its main features, though he does not pretend to be perfectly accurate in every detail.

This affiant further states, that he has carefully examined the specifications and claims of Prof. Samuel F. B. Morse, as set forth in his patent granted on the 20th day of June, 1840, reissued on the 15th day of January, 1846, and again reissued on the 13th day of June, 1848, for the "American Electro-magnetic Telegraph," and also his patent granted on the 11th day of April, 1846, and reissued on the 13th day of June, 1848, for certain improvements thereon; he has compared the said "Columbian Telegraph" with the said "American Electro-magnetic Telegraph," for the purpose of ascertaining whether the former was in any respect an infringement of Morse's patents aforesaid.

This affiant, upon such full examination, is prepared to state that the said apparatus and machinery, as used in the said office at Louisville, Ky., does infringe the patent rights of the said Morse for the "American Electro-magnetic Telegraph," and the improvements thereon in the respects following, to wit:

First. In using the motive power of magnetism when developed by the action of the galvanic current, or current of electricity, substantially as set forth in the description of the first principal part of Morse's invention contained in the specification of *of* Morse's patents, as means of operating or giving motion to machinery to imprint signals upon paper or other suitable material, for the purpose of telegraphic communication. The mechanical arrangements in this part of the apparatus are identical as used in the American system of Morse, and of the Columbian of Barnes and Zook, except that the "receiving magnet" of Morse is substituted by the "receiver" of Barnes and Zook; both of which, however, are equally operated upon and moved by the magnetism or motive power of the electric or galvanic current.

Second. In the employment of a register or recording instrument, corresponding in principle and effect with that employed by Morse, and substantially set forth in his specification aforesaid. The trains of clock work to regulate the movement of the paper, constituting a part of the register, are virtually the same in Morse's system and in Barnes and

Zook's. An electro-magnet constitutes an essential part of both instruments, and neither can be worked without it. In Morse's it is stationary and gives motion to the pen by attracting the armature affixed to one end of the pen lever. In Barnes and Zook's it is moveable, being suspended to one end of the pen lever, and when magnetized, is moved to and fro by the attraction and repulsion of its own poles, for and against the poles of the two fixed magnets, between which it is suspended, carrying with it in its vibrations one end of the pen lever.

The result in both instruments is, movements of the pen precisely alike, and producing precisely the same effects. In Morse's system the point of the pen is withdrawn from the paper by a small spiral spring; in Barnes and Zook's a second local circuit is introduced for the same purpose. The magnetism of the circuit strikes the blow, and that of another withdraws the pen. One of the fixed magnets is introduced for the purpose of giving more force to the blow, and the other to hasten the return of the pen to its former position; but both of them are powerless of themselves to move the pen, or attract or repel the moveable electro-magnet, until that is magnetized by the current upon the local circuits. The magnetism of this current is the power in both instruments, whatever may be the mechanical arrangements.

The fixed magnets of the register, as well as the needles of the receiver, have to be occasionally taken out and magnetized to maintain their character as fixed magnets, during which time and process the instruments are useless.

Third. In using the same combination of machinery constituting the "American Electro-magnetic Telegraph," as described by Morse in his specifications aforesaid, with no alterations in principle or in the modes of producing the results.

Fourth. In using the combination of two or more galvanic or electric circuits with independent batteries, for the purpose of obviating the diminished force of electro-magnetism in long circuits, and obtaining sufficient power to operate the register or recording machinery at any distance. This is one of the vital principles of Morse's invention, and is the only means known to this affiant, and he believes to any one else, by which sufficient magnetism or magnetic power can be obtained from the electric or galvanic current, to make, by means of a point, such as that of Morse's pen lever, a visible and distinct marking or indentation upon paper at a distance.

Fifth. The using the same system of signs, consisting of dots and spaces, and dots, spaces, and horizontal lines, described in the specification to Morse's patents, aforesaid.

This affiant has seen the "Columbian Telegraph" aforesaid, in the Louisville office of the "People's line" so called, within the last month, writing the letters of Morse's telegraphic alphabet without alteration in the combination of dots, spaces, and lines, making up the letters thereof, and is informed and believes that such is the common practice of the offices on said line; but he is also informed and believes, that the names of some of the letters are sometimes changed without any change

in their component parts, and this change of names is called a different alphabet.

Sixth. In using the same system of signs in combination with machinery for recording them, which machinery is described in the specifications aforesaid.

Seventh. In using a "receiving magnet" in the Barnes & Zook instrument, called a "receiver," being a device for breaking and closing the local or office circuits, in combination with such circuits as described in the specifications of Morse's patent, dated 11th April, 1846, and reissued on the 13th June, 1848. The combination referred to in said claim, though the same in principle, is different in mechanical arrangement from that referred to in Morse's original patent, and the reissues thereof aforesaid, in this respect, viz., the combination described in the latter is that of two or more circuits, composing parts of one main line, each of which parts may be used for the double purpose of working a register and closing and breaking the next circuit in the series; whereas, the combination described in the former is composed of one circuit, constituting the main line, and performing no other office than to close and break the local or office circuits, to which the registers are attached, and these local or office circuits, constituting no part of the main line, perform no other office than to work the registers.

The latter is the combination now in use on all the lines of Morse's telegraph, and is the same employed on the "People's line" so called, the "receiver" being considered a "receiving magnet" which takes its name from its office and not from any peculiar form.

Eighth. In using the combination of the point or points of the pen and pen lever, with the grooved roller or other equivalent device over which the paper passes, for the purpose of receiving the impression of the characters, and thus marking or printing by indentation. In this respect the Barnes & Zook instrument is an undisguised infringement of Morse's claim; the point and roller being used in the same combination and for the same purpose, and the marking being by indentation in precisely the same way.

Ninth. The Barnes & Zook instrument is a direct infringement of the essence of Morse's invention as defined in his specifications aforesaid, being the same application of the same power to the same end. The same power is used, the same result produced, the same general process employed.

This affiant further states, that during the last five months having resided and travelled much in the States of Tennessee and Kentucky upon the business of Morse's telegraph, and being intimate with those engaged in its construction, he has witnessed the disastrous effects upon the value of Morse's patent rights in that section of the country, of the pretensions of Henry O'Rielly, that he possessed a system of telegraphing superior to Prof. Morse's and not conflicting with his legal rights, and by putting in use, as such independent and better system, the instruments of Barnes & Zook, called the "Columbian Telegraph" herein described.

But for such pretensions and acts, he has no doubt, the funds would have been readily procured to construct the line of Morse's telegraph from Louisville to New Orleans, upon the terms of an equal partnership with the owners of the patents, and the same would have now been finished and in operation, yielding Prof. Morse and his associates a liberal income.

The affiant further states, that he has reason to believe, and does believe, that the declarations and acts of Henry O'Rielly aforesaid have had a most injurious effect upon the value of Morse's patent rights throughout the western country, and to some extent throughout the United States.

JAS. F. FOSS.

New York, August 8th, 1848.

UNITED STATES OF AMERICA,
Southern district of New York, ss.

Personally appeared on this eighth day of August, 1848, before me, the undersigned United States commissioner, James F. Foss, who is known to me, and being duly sworn on the holy evangelist of Almighty God, doth depose and say, that the contents of the foregoing affidavit subscribed by him are just and true, to the best of his knowledge, information, and belief. In testimony whereof I have hereunto subscribed my name the day and year above written.

GEO. W. MORTON,
U. S. Com.

UNITED STATES OF AMERICA,
Southern district of New York, ss.

I, Alexander Gardiner, clerk of the circuit court of the United States of America, for the southern district of New York, second circuit, do hereby certify, that I am well acquainted with the handwriting of George W. Morton, whose name is subscribed to the annexed deposition, and that the signature to the same is in his proper handwriting. And I do further certify, that he was at the time of signing the same a commissioner duly appointed by the circuit court of the United States of America, for the southern district of New York, under and by virtue of the act of Congress in such case made and provided.

In testimony whereof I have hereunto subscribed my name and affixed the seal of the said circuit court, this eighth day of Au-
[L. S.] gust, in the year of our Lord one thousand eight hundred and forty-eight, and of the independence of these United States the seventy-third.

ALEX. GARDINER.

Affidavit—T. C. McAfee.

MORSE et al.
vs.
O'RIELLY et al.

Thomas C. McAfee states, that he resides in Louisville, Ky., and is

now, and has been for about four months, a telegraphic operator in the office established by the owners of Morse's patents in that place, from which a line extends to Maysville, Ky., and one to Nashville, Tennessee. In the same building is the office erected by H. O'Rielly, from which a line of telegraph extends to Nashville, built by said O'Rielly, and sometimes called the People's line. Affiant was in the said office at various times in the months of April, May, and June last, and saw the apparatus for transmitting and receiving intelligence along said line to Nashville in operation. Affiant has read the affidavit of J. F. Foss, made on the day of to be read in this cause, and thinks it accurately describes said apparatus. Affiant knows E. L. Whitman and W. F. B. Hastings; they were employed in the said office and engaged in the operations thereof, and affiant has always understood by said O'Rielly, Whitman is there yet. Affiant states, that the two lines of the patentees and of O'Rielly to Nashville, pass along the same road; that owing to the lapping or touching of the wires, it happened about the end of March last, that a message of some 20 words transmitted by the apparatus aforesaid, in the said office of O'Rielly to Nashville, was communicated to the wire of the line of the patentees, returned along the same, and was received and registered by the instrument in charge of affiant in the office of the patentees, and read by him. The marks then made by the register were without any variation, the same dots and lines and combinations thereof, which constitute the alphabet of Morse's patent, and which were and are used in the office in which affiant operates; and during the month of April the same thing occurred several times; on each occasion the message was received in the combinations of dots and lines which compose Morse's alphabet, the same in every respect as if it had been transmitted along the line of the patentees to Nashville; said line is completed and has operated.

Affiant states, that early in the spring it was generally said and believed by him that the office of said O'Rielly was closed, and that the public were not allowed to see the apparatus for telegraphing to Nashville, and he believes it was kept closed for some time, until some publications were made in the papers by Mr. Shaffner on the subject.

The affiant states, that on Wednesday last he was in the office of the said People's line, in Louisville, and inspected the apparatus for telegraphing, which was then, and as affiant was informed, had been for some short time, in use on the line to Nashville. He was also present to-day at the exhibition, by Smith and Barnes, of the telegraphic apparatus. He states that the apparatus which he saw at the said office on Wednesday resembled, or was the same, as that shown to-day, except that the telegraphic marks which it made were made by a lever, with a point upon it similar to that used upon Morse's instrument; at the lower extremity of which lever was the bar of soft iron with the coil of wire around it, which played between the ends of the two permanent magnets. In the apparatus shown to-day in court, the mark is made by a point at the end of an arm, extending up from a carriage, which moves on rollers.

Another difference between the two instruments is in the substitution in the one shown to-day of a fixed piece of brass, upon which the paper is drawn and receives the marks, in lieu of a grooved roller, which was in the instrument in the office aforesaid, and which was similar in all respects, as affiant believes, to the grooved roller in Morse's instruments, and described in his patents. Affiant further states that that part of the said apparatus, in the aforesaid office, which was used for the purpose of carrying the paper and receiving the marks upon it, was the same combination and arrangement of a weight, clock work, rollers with a groove in one of them, and pen point, which is used in Morse's instrument, and is described in his specifications; and affiant thinks that the pointed arm upon the carriage moved upon rollers, and the fixed piece of brass, upon which the paper is made to pass by the power of the two rollers which hold it, are but mechanical equivalents, and indifferent ones, too, for the pen lever and the grooved roller.

Affiant not having operated with this machine, cannot speak of its performances, but he supposes the introduction of these equivalents are not improvements, but the contrary. THOMAS C. McAFEE.

KENTUCKY, *Franklin county, sct.*

This day Thomas C. McAfee appeared before me, a justice of the peace for the county aforesaid, and made oath that what he has stated in the foregoing affidavit is true, to the best of his knowledge and belief. Witness my hand this 26th day of August, 1848.

JAMES SHANNON, *J. P.*

Affidavit of N. P. Poor.

The affidavit of Peabody Poor, of the city of Louisville, and personally known to me, taken before me, a commissioner of affidavits of the United States circuit and district court, in and for Kentucky, at my office, in the city of Louisville, on this 23d day of August, 1848. Being of lawful age, and solemnly cautioned and sworn, deposeth and says, on behalf of complainant, in a matter of controversy pending in said court, wherein S. F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

I state that, during the late Kentucky elections I transmitted messages to Nashville, through the office known in Louisville as the O'Rielly line of telegraph, and which were paid for by the publisher of the Nashville Union, a newspaper printed in that city, whose correspondent I was in those messages, and I have continued so to transmit messages at various [times] since said election up to the present week; and I further say that, during the week of the said election, I received several messages on said line of telegraph from the Nashville Union office, which, as I understood were paid for by said office. And further saith not,

N. PEABODY POOR.

Subscribed and sworn to this 23d August, 1848, as stated in the caption. W. S. PILCHER, *Com'r.*

Affidavit of S. E. Morse.

CITY OF LONDON, *to wit:*

I, Sidney E. Morse, of New York city, at present residing in London, do solemnly, sincerely, and truly swear.

1st. That I am the author of the article in the New York Observer of April 15th, 1837, headed "Newly Invented Telegraph."

2dly. That by the "gentleman of our acquaintance" spoken of in that article, I intended my brother, Samuel F. B. Morse, then of New York city, and now of Poughkeepsie, in the State of New York.

3dly. That although I gave a general plan of a telegraph of 24 wires, each representing a letter of the alphabet," this was my own idea, and not my brother's; for I was well acquainted at the time with his plan of using but a single circuit of wire, and of using a conventional system of signs, composed of dots and spaces, for numerals.

4thly. That my brother communicated to me his plan of an electrical telegraph in November, 1832, while I was walking with him from the ship Sully (in which he had just arrived from Havre, and which was then lying at Rector street wharf in the city of New York) to the house of my brother, Richard C. Morse, in the eastern part of the city, where my brother, the said Samuel F. B. Morse, remained for some time after his arrival. He was full of the subject of the telegraph during the walk from the ship, and for some days afterwards could scarcely speak about anything else. He expressed himself as anxious to make apparatus and try experiments, for which he had no materials or facilities on ship-board. In the course of a few days after his arrival, he made a kind of cogged or saw-toothed type—the object of which, I understood, was to regulate the interruptions of the electrical current, so as to enable him to make dots, and regulate the length of marks or spaces on the paper upon which the information, transmitted by his telegraph, was to be recorded. He proposed at that time a single circuit of wire and only a single circuit, and letters, words, and phrases were to be indicated by numerals, and these numerals were to be indicated by dots or other marks and spaces on paper. It seemed to me that, as wire was cheap, it would be better to have 24 wires—each wire representing a letter of the alphabet; but my brother always insisted on the superior advantages of his single circuit. From the time that he communicated to me his plan of electrical telegraphs in November, 1832, I was deeply impressed with the facility and vast importance of this mode of transmitting information, and often made it the subject of conversation with my friends; but as the whole matter of electric telegraphs was then entirely new, I generally spoke of an electric telegraph of 24 wires, because it was easy to make everybody comprehend the operation of such a telegraph, while it required some effort of attention and imagination to comprehend the operation of my brother's; and because, too, as I have already stated, I thought that there were important advantages, constituting on the whole a superiority in the use of 24 wires. In this last opinion, how-

ever, I was always opposed by my brother, the inventor of the telegraph, whose plan from the beginning was only a single circuit.

SIDNEY E. MORSE.

Sworn before me, in the consulate of the United States of America, at London, this twentieth day of April, A. D. 1848.

THO. ASPINWALL,

[L. S.] *Consul of the United States for London, &c.*

The following is the publication referred to in the foregoing affidavit of Sidney E. Morse, to wit, Newly Invented Telegraph:

Publication referred to in the affidavit of S. E. Morse.

We take the following from a Washington letter in the Baltimore Patriot:

"Mr. Gonon and his associate, Mr. Sewell, have, after many years application to the subject, invented an important system of telegraphs, which casts into the shade everything of the same kind that has yet been attempted. By their admirable plan they can communicate every kind of information, word by word, and punctuate the same, without using more signals than words, and with as much rapidity as a person can write, or even speak! They have received the most flattering encouragement from those literary and scientific gentlemen to whom they have explained the system, and not a doubt is entertained that it will accomplish the purposes of the inventors, and realize all that has been anticipated from it. Mr. Gonon assures us that he will be able to communicate a despatch of one hundred words from New York to New Orleans in half an hour! and those who are thoroughly acquainted with the system confirm his promises. How elementary does every other system appear in comparison of that which can accomplish such an object. The imagination is overpowered in contemplating the consequences of such an achievement of human ingenuity. Distance is annihilated. Thousands of miles no longer divide us. We know on the instant, as it were, the actions, the wishes, the determination of our fellow beings of other States. Fortunate it is that we live in an age for whose intellectual progress nothing is too ripe."

We know nothing of the telegraph of Messrs. Gonon and Sewell, except what is related in the above paragraph; but we do know that a gentleman of our acquaintance, several years since, suggested that intelligence might be communicated almost instantaneously hundreds, if not thousands, of miles by means of very fine wires, properly coated, to protect them from moisture, and extending between places thus widely separated. It is well known that the electric fluid occupies no perceptible time in passing many miles on a wire; and if it is possible, by connecting one end of the wire with an electrical or galvanic battery to produce any sensible effect whatever at the other, it is obvious that if there are twenty-four wires, each representing a letter of the alphabet, they may be connected with the battery successively in any order; and if so connected in the order of the letters of any word or sentence, that

word or sentence could be read or written by a person standing at the other end of the wires. All the letters of a paragraph in a newspaper could thus be touched successively by a man in Philadelphia, and the contents, verbatim et literatim, be conveyed to New York as fast as a compositor could set up the type! It is not impossible that the time may be near when speeches in Congress, taken down by reporters, and conveyed by these "electric telegraphs" to New York or New Orleans, may be in type, printed, circulated, and read, within a few hours after the voice of the speaker has ceased at Washington! The wires necessary for a distance of a hundred miles need not weigh many pounds, and if enclosed in an India rubber tube, and supported on high poles erected along the route at intervals of 4 or 500 feet, could be extended through an immense distance at a trifling expense. The feasibility of the project depends entirely upon the practicability of producing any sensible effect at one end of a long wire by connecting the other end with an electrical or galvanic battery.

Affidavit of L. D. Gale.—Affidavit of L. D. Gale.

I, LEONARD D. GALE, of Washington city, in the District of Columbia, on oath depose and say:

That in the month of January, in the year one thousand eight hundred and thirty-six, I was a colleague professor in the University of the city of New York with Professor Samuel F. B. Morse, who had rooms in the university building on Washington square in said city. That during the said month of January, of the year aforesaid, the said Professor Morse invited me into his private room in the said university, where I saw for the first time certain apparatus constituting his electromagnetic telegraph.

The invention at that time consisted of the following pieces of apparatus. Sheet 1.

First. A train of clock wheels, being part of a common wooden clock, adapted by the said Morse to regulate the motion of a strip of paper, or ribbon formed of strips of paper pasted together, end to end, about one and an half inch wide.

Second. Three cylinders or drums of wood arranged as in the accompanying drawings of the apparatus, which drawings represent the apparatus essentially as then constructed, to wit, A, B, C, are the cylinders; A is the paper cylinder from which the paper is unrolled, passing over cylinder B to cylinder C, which is connected with and moved by the clock machinery of D, which is the wooden clock of which I spoke, and which was moved by the weight E. A wooden pendulum F, of the shape delineated, was suspended over the center of cylinder B, having its pivot at f. This pendulum had its motion at right angles or across the paper when the paper was in motion. In the lower part of the pendulum, through two cross pieces, was fixed a pencil case in which a pencil moved easily up and down, and was kept in constant contact with the paper by a light weight g. At h was a projecting shelf

from the frame XX, upon which shelf was an electro-magnet fixed while the armature to be attracted by the said magnet was fixed upon the pendulum. The wires or conductors from the helices of the magnet passed one to one pole of a single pair galvanic battery I, while the other wire passed to a cup of mercury k at the port rule. The other pole of the battery was connected by a wire to the other cup of mercury l.

Third. The port rule represented below the table; this port rule was a rude frame, containing two cylinders LL, about two inches diameter and two inches long; one of them was turned by a crank, and they were connected by a band of green worsted binding about one and a half inch diameter. M was the rule or composing stick, it was made by two small thin rules about two feet long, side by side, but separated about the eighth of an inch from each other, forming a sort of trough in which were set up the type hereafter to be described, the cogs of which type are seen projecting on the top of the rule M. At N two standards were raised from the sides of the long frame of the port rule and united at the top, in which standards was suspended a lever o o. At one end of this lever was a fork of copper wire, to be plunged when the lever was depressed into the two cups of mercury k and l; the other end of the lever bore a weight to keep that end down, and beneath the weight was a tooth like those upon the keys of a hand organ.

Fourth. There was a series of pieces of thin type metal, which Prof. Morse called type, and which he showed me also in drawings in a sketch book, which drawings he informed me he had made on board the ship. These are accurately represented in the subjoined drawing. They consisted of eleven pieces, having from 1 to 5 cogs each, except one which was used as a space; the first five numbers consisted of cogs from 1 to 5 respectively, with a short space after; the second 5 numbers consisted also of cogs from 1 to 5 respectively, but with a long space after, a space double the length of the first.

The operation of the apparatus when used was this, suppose that the numbers 456, 320, and 4 were to be the numbers desired to be sent, the type 4, 5, 6, were set up in the rule M, after which a space was put to separate the whole number from the next, and so on. The rule M was then placed on the band of the port rule, and by turning the crank the rule was sent gradually forward, the cogs of the type, operating the lever o, o, to break and close the circuit of the battery I; when the circuit was closed the magnet h attracted the pendulum F, causing a movement of the pencil g of about one-fourth of an inch. The pencil being in contact with the paper, if the paper moved in the direction of the arrow, or vice versa, a continuous straight line was marked upon the paper, while the pendulum was stationary either at one or the other limit of its motion, but when attracted by the magnet from one limit to the other, and suddenly released by the cessation of the magnetic force, it marked a v shaped point, as in the "example of imprinting" in the drawing, and the successive breakings and closings of the circuit by the cogs of the type caused the points to be impressed or marked upon the

moving paper in the manner there shown. By reading the extremities of the v shaped points as points, the figures intended were readily recognised.

I further depose and say, that during the year 1836, and beginning of the year 1837, the studies of Prof. Morse on his telegraph I found much interrupted by his attention to his professional duties, so that for several months the instruments remained as they have been above described. I understood that want of pecuniary means prevented Prof. Morse from procuring to be made such mechanical improvements and such substantial workmanship as would make the operation of his invention more exact.

I further depose and say, that, in the months of March and April, 1837, the announcement of an extraordinary telegraph on the visual plan, (as it afterwards proved to be,) the invention of two French gentlemen, of the names of Gonon and Sewell, was going the rounds of the papers. From its wonderful and very pompous, as well as mysterious, pretensions, it was supposed that it could be no other than an electric telegraph; and the thought occurred to me, as well as to Prof. Morse and some others of his friends, that the invention of his electromagnetic telegraph had some how become known, and was the origin of the new telegraph thus conspicuously announced. This announcement at once aroused Prof. Morse to renewed exertions to bring the new invention creditably before the public, and to consent to a public announcement of the existence of his invention. This was done in the New York Observer, of April 15th, 1837; from April to September, 1837, Professor Morse and myself were engaged together in the work of preparing magnets, winding wire, constructing batteries, &c., in the university, for an experiment on a larger but still very limited scale, in the little leisure that each had to spare, and being at the same time much cramped for funds.

The labors of Professor Morse at this period were mostly directed to modifications of his instruments for marking, contriving the best modes of marking, varying the pencil, the pen, using plumbago and ink, and varying also the form of the paper, from a strip of paper to a sheet.

The latter part of August, 1837, the operation of the instruments were shown to numerous visiters at the university.

It was early a question between Professor Morse and myself, where was the limit of the magnetic power to move a lever? I expressed a doubt whether a lever could be moved by this power at a distance of 20 miles, and my settled conviction was, that it could not be done with sufficient force to mark characters on paper at 100 miles distance. To this Professor Morse was accustomed to reply, "if I can succeed in working a magnet ten miles, I can go round the globe." The chief anxiety, at this stage of the invention, was to ascertain the utmost limit of distance at which he (Morse) could work or move a lever by magnetic power. He often said to me, "it matters not how delicate the movement may be, if I can obtain it at all, it is all I want." Prof. Morse often referred to the number of stations which might be required, and which, he observed, would add to the complication and expense.

The said Morse always expressed his confidence of success in propagating magnetic power through any distance of electric conductors which circumstances might render desirable. His plan was thus often explained to me: "Suppose," said Professor Morse, "that in experimenting on twenty miles of wire, we should find that the power of magnetism is so feeble that it will but move a lever with certainty a hair's breadth, that would be insufficient, it may be, to write or print, yet it would be sufficient to close and break another or a second circuit twenty miles further, and this second circuit could be made, in the same manner, to break and close a third circuit twenty miles further; and so on around the globe."

This general statement of the means to be resorted to, now embraced in what is called the "receiving magnet," to render practical writing or printing by telegraph, through long distances, was shown to me more in detail early in the spring of the year 1837, (one thousand eight hundred and thirty-seven,) and I am enabled to approximate the date very nearly, from an accident that occurred to me from falling on the ice formed of late snow in the spring of that year. The accident happened on the occasion of removing to Professor Morse's rooms in the New York university some pieces of apparatus to prepare a temporary receiving magnet.

The apparatus was arranged on a plan substantially as indicated in the drawings on sheet 2 accompanying this affidavit. 1 is a battery at one terminus of a line of conductors representing 20 miles in length, from one pole of which the conductor proceeds to the helix of an electro-magnet at the other terminus, (the helix forming part of the conductor;) from thence it returns to the battery end, terminating in a mercury cup, o. From the contiguous mercury cup, p, a wire proceeds to the other pole of the battery; when the fork of the lever C unites the two cups of mercury the circuit is complete, and the magnet b is charged, and attracts the armature of the lever, d, which connects the circuit of battery 2 in the same manner, which again operates in turn [on the] lever e, twenty miles further, and so on.

This, I depose and say, was the plan then and there revealed and shown to me by the said Professor Morse, and which, so far as I know, has constituted an essential part of his electro-magnetic telegraph from that date till the present time.

It was on Saturday, the second day of September, 1837, that Professor Danberry, of the English Oxford university, being on a visit to this country, was invited with a few friends to see the operation of the telegraph in its then rude form in the cabinet of the New York city university, where it then had been put up with a circuit of 1,700 feet of copper wire stretched back and forth in that long room. I well remember that Professor Danberry, Professor Torry, and Mr. Alfred Vail were present, among others. This exhibition of the telegraph, although of very rude and imperfectly constructed machinery, demonstrated to all present the practicability of the invention, and it resulted in enlist-

ing the means, the skill, and the zeal of Mr. Alfred Vail, who early the next week called at the rooms, and had a more perfect explanation from Professor Morse of the character of the invention. The doubt to be dispelled in Mr. Vail's mind, as he then stated, and has since frequently stated, was, whether the power by magnetism could be propelled to such a distance as to be practically effective. This doubt was dissipated in a few minutes conversation with Professor Morse, and I have ever been under the full conviction that it was the means then disclosed by Professor Morse to Mr. Vail, to wit, the plan of repeating the power of magnetism at any distance required, which I have stated, that induced Mr. Alfred Vail and his brother George Vail at once to interest themselves in the invention, and to furnish Professor Morse with the means, material, and labor, for an experiment on a larger scale. From this time commenced the operations at the iron works at Speedwell, near Morristown, New Jersey, where was made the instrument which showed to Congress, in the commencement of the year 1838, the operation of the electro-magnetic telegraph of Professor Morse.

LEONARD D. GALE.

CITY OF WASHINGTON,
District of Columbia, sct.

On the first day of April, 1848, before the subscriber, mayor of the city of Washington, personally appeared Leonard D. Gale, and signed and made oath to the truth of the preceding deposition, and to the accuracy of the annexed illustrative diagrams.

Witness my hand and the seal of the corporation of Washington, [L. S.] the day and year above written.

W. W. SEATON, *Mayor.*

Attest: C. H. WILTBERGER,
Register.

(Affidavit of P. S. Fall, to wit:)

Affidavit of P. S. Fall.

Questions to Rev. P. S. Fall.

1st. Are you acquainted with Morse's Electro-magnetic Telegraph, and with the form of the apparatus and its principles, and mode of operation?

2d. Are you acquainted with the Columbian Telegraph and its principles, and mode of operation?

3d. State your opinion of these two telegraphs, with reference to the question, whether they are the same or different in principles, and whether the Columbian is any improvement on Morse's. State the reasons of your opinions.

Answer 1st. I think I understand the electro-magnetic telegraph of Professor Morse, both as to its principle and mode of operation. Motion is produced in a lever attached to the armature of an electro-mag-

net. While the electric current circulates in the coil of wire wound around a piece of soft iron, that iron is magnetic. It then attracts the armature and elevates the point which records the character on paper. When the current ceases to circulate, the iron is no longer magnetic, and the armature is released. The local circuit gives intensity to the current conveyed by the telegraphic wire.

Answer 2. I have examined the Columbian Telegraph now in the United States court-room, and think I understand also its principle and mode of action.

Motion is communicated to a vertical arm, attached to the centre of a horizontal electro-magnet. This rests on a carriage, and is placed between two permanent magnets moving backwards and forwards between them, according to the direction of the current around the electro-magnet. Two local circuits are employed to give intensity to the current conveyed by the telegraphic wire, and to change the direction of the current circulating around the electro-magnet.

Answer 3d. There is considerable difference in the mechanical arrangements of these telegraphic registers; but all that is essential to the end obtained by the Columbian is found in that of Professor Morse. The former appears to me to be encumbered by much not essential to that end ; namely, the making of symbols upon paper by means of a point attached to the extremity of an arm, to which motion is communicated by the conversion of soft iron into a temporary magnet. This is the same in both instruments; but in one the arm is attached to a moveable armature; and in the other to a moveable magnet.

The horse-shoe magnets in the Columbian instrument do not appear to me to be necessary to the proposed end; because, if one were removed, the other replaced by a piece of soft iron, and the arm suspended upon a fulcrum instead of resting with the magnet on a carriage, the same results would follow, by means much more simple than those now employed.

As at present arranged, the Columbian instrument would not work at all, unless the polarity of the moveable magnet to which the recording arm is attached were reversed every time it became necessary to reverse its motion. This effect might be as fully produced by a single fixed armature towards which the magnet would move, while the contact was made; and from which it would be released and resume its original position when the contact was broken ; since then, the electro-magnet is but a piece of soft iron, like the armature, and would have neither magnetic attraction or repulsion.

Nor does it make any difference in principle, whether motion be communicated to the electro-magnet or to the armature.

If the latter be fixed, the magnet will move, and vice versa. The armature is, during the contact, rendered magnetic by induction, whether fixed or moveable; and the instant the contact is broken, both resume the unmagnetic state as above mentioned. Whatever differences may appear in the details of these instruments, they do not seem to me to differ in the principle upon which they act; nor do I consider the

Columbian any improvement on that of Professor Morse, inasmuch as, in the latter, the same ends are reached most efficiently by means that are of most admirable simplicity.

P. S. FALL, *A. M.*

Subscribed and sworn to before the undersigned, a justice of the peace, this 31st day of August, 1848.

JAMES SHANNON, *J. P.*

Affidavit of T. P. Shaffner.

(Affidavit of T. P. Shaffner.)

SAMUEL F. B. MORSE et al.
vs.
HENRY O'RIELLY et al.

In equity, in the circuit court of the United States, for the district of Kentucky.

Affidavit of Taliaferro P. Shaffner.

This affiant states, that about the first of May, 1847, an original letter of Henry O'Rielly to Messrs. Gholson and Davis, then of Louisville, Kentucky, was put into his hands by the latter gentleman, in which he, the said O'Rielly, remarked in substance, that he had taken measures to secure means of telegraphing independent of any one set of patentees.

The correspondence between the said O'Rielly and the said Gholson and Davis, led to an arrangement between them in June, 1847, altered and enlarged in August of that year, by which the latter gentleman undertook to get up telegraph lines in the States between the Ohio river and the Gulf of Mexico, embracing the lines from Louisville to New Orleans, and Louisville to Lexington, to be operated by other systems of telegraphing than Prof. Morse's, among which was that of Royal E. House and that of Charles B. Moss.

This affiant states that he was induced by representations made to him as to the excellence and availability of those systems, to connect himself with the said Gholson and Davis in the enterprise, and particularly to get up a line from Louisville to Lexington.

This affiant further says, that to satisfy him that he, the said O'Rielly, had the control of other systems of telegraphing than that invented and patented by Samuel F. B. Morse, some of which he represented as superior to the said Morse's, he, the said O'Rielly, put into this affiants hands what purported to be copies of the following papers, viz:

1. A contract between Royal E. House and William Ballard of the one part, and Henry O'Rielly, Hugh Downing, and Samuel L. Selden of the other part, dated the 16th day of November, 1846, with assignments of said Downing and Selden of all their interests therein to the said O'Rielly, dated respectively, the 20th and 22d May, 1847.

This contract purported to reserve the right to use House's telegraph on the line from Louisville to New Orleans and many others, including the line from Philadelphia to St. Louis, giving for the use of the

same one-fifth of the stock, and also an agreement supplementary thereto, entered into May 22d, 1847.

2. A contract between Charles B. Moss of the one part, and Henry O'Rielly of the other part, dated December 1, 1846, (erroneously written, 1847,) by which the said O'Rielly purchases the right to use a certain telegraph alleged to be invented by said Moss, throughout the United States, conveying to said Moss one-tenth of the stock on all the lines where it might be used, excepting those where telegraphs were already built, and on them one-fifth.

3. A contract between Francis S. Pease and Henry O'Rielly, dated the — day of —, nearly the same in substance as that made with Charles B. Moss.

These papers were placed in affiant's hands about the latter part of June, 1847, and copies of them have been furnished Mr. Kendall by affiant.

This affiant further states that Henry O'Rielly appeared at the time to place his principal reliance on the invention of Charles B. Moss, which it was understood was to be used on the line to be constructed by this affiant between Louisville and Lexington.

This affiant found it necessary to the success of his enterprise that he should be enabled to give to those whose aid he invoked some definite information in relation to the kind of telegraph he proposed to employ, and to that end he opened a correspondence with Charles B. Moss, the represented inventor, and was much disappointed to learn from him that the invention was not perfected, and that it was impossible to tell when it would be.

This affiant also repeatedly conversed with Henry O'Rielly on the uncertainty of procuring any instrument from Mr. Moss to put on the Lexington and Louisville line, and was repeatedly told by him, in substance, that he need not fear, for if he was disappointed in that quarter, he would get some modification [of] Steinheil's telegraph, which would answer to keep off the patentees of Morse's telegraph.

This affiant further states, that having given up the hope of obtaining any instrument on Moss's plan, he did, in conjunction with Messrs. Gholson and Davis, enter into a contract about the first of October, 1847, providing for the construction of a line of Morse's telegraph from Cincinnati, in the State of Ohio, by way of Lexington, in the State of Kentucky, to Nashville, in the State of Tennessee.

Soon after he entered into this contract, he was informed by John J. O'Rielly, brother of Henry O'Rielly, that they considered themselves authorized to build the line from Louisville to New Orleans, by the contract of Henry O'Rielly with Prof. Morse and his associates, and that they intended to build it. This affiant then inquired of Henry O'Rielly whether he claimed a right to build the line from Louisville to New Orleans under his contract with Prof. Morse and his associates, and he answered in the affirmative.

This affiant further states, that the failure of Messrs. Gholson and Davis prevented further action under that contract, and on the 23d of

December, 1847, he, in connexion with William Tanner, entered into a contract with Messrs. Kendall and Smith providing for the construction of a line of Morse's telegraph from Lexington, Kentucky, through Louisville, to Nashville, Tennessee; that on the same day he informed Mr. C. G. Oslere, who was an agent of Henry O'Rielly, and Mr. John J. Rielly, his brother, that Mr. Tanner and this affiant had the contract to put up the line as aforesaid, and that it would be done certain, as Messrs. Smith and Kendall would furnish the money, and there would be no delay in the construction. Next morning Mr. Oslere met this affiant on the street, and informed him that they had received a despatch from Henry O'Rielly, St. Louis, directing them to proceed with the line to Nashville and New Orleans. On that afternoon hands were engaged under Mr. O'Rielly's agency, on which occasion some 50 or 60 poles were put up. The poles and holes used were those arranged and prepared the fall before by Messrs. Gholson and Davis, &c., for the telegraphs of Charles B. Morse, or Royal E. House, under the arrangement with Mr. O'Rielly.

Nothing was done aforesaid for several days after. On about January 4th, 1848, a gang of 27 men were employed by this affiant in digging the holes for Morses' Telegraph on the said line, and by the arrangements made by this affiant his hands overtook those of Mr. O'Rielly a short distance below Bardstown, Ky.; and this affiant further states, that the hands of both lines remained over Sabbath in Bardstown; and that during the next week, while the hands were engaged on opposite sides of the road they were racing with their work for many miles, and eventually the hands on Morses' line got ahead, and remained so until they got to the State line of Tennessee and Kentucky, where a gang from Nashville were to meet them. When this affiant's hands got to the State line they were some miles ahead of those of Mr. O'Rielly. This affiant further states, Capt. John J. Rielly, through Mr. C. G. Oslere, proposed that his line should be on the right hand side of the road, and this affiant's on the left, that there might not be any interruption of the two lines, and that this arrangement was agreed to before the hands of either party were 20 miles from Louisville, and that this affiant, in company with D. S. Crockett, of Frankfort, went out on the road and gave directions to the agents on Morses' line to observe the agreement, which was done from a point five miles below Mt. Washington, and Mr. Oslere's hands observed the arrangement from a point about five miles from Bardstown, towards Louisville.

This affiant also states, that the agents of Mr. O'Rielly reported on the road that he, Mr. O'Rielly, had the right to construct the line from Louisville to New Orleans, and not this affiant, and that in order to correct the impression that those agents had generally made, he caused to be printed several thousand circulars containing a publication of Mr. Kendall issued at Nashville, and the legal opinions of sundry eminent lawyers of Kentucky and Tennessee, to the effect that Mr. O'Rielly had no right to build said line under the Morse contract. These cir-

culars were circulated very extensively by this affiant's agents all along the road. He refers to a copy of said circulars appended to this affidavit, marked (E.)

This affiant further states, that after it was announced that the Morse instrument would not be used on the O'Rielly line, he used every exertion to ascertain the kind of instrument which would be used, but could not succeed, until he heard in the papers that the line was working with the Columbian Telegraph. This affiant further states, that in consequence of the office in Louisville being kept locked he was unable to ascertain the kind of instrument that was used. He often expressed a desire to see it to Mr. Witman, one of the defendants in this cause, but he never succeeded until hereinafter mentioned.

This affiant further states, that the instruments were put on the line about the 6th of March, 1848, and in a short time thereafter, March 23d, or a few days before, were taken off again, to be in some particular improved. Up to about the 15th day of April, 1848, the line had not worked successfully, and as additional evidence that it did not he refers to an article which he caused to be published in the Louisville Journal, of date April 8th, 1848, containing an extract from the editorial of the Nashville Union, of April 4th, 1848; this article is hereto appended, and marked (F.)

This affiant further refers to another publication in the same Journal, and to the editorial accompanying, corroborating the above statement, marked (G.)

And he refers to another publication in the same paper, publicly announcing that the doors of the office of the said People's line were kept closed, &c., marked (H.)

These publications, signed by this affiant, also appeared in the Louisville Democrat. It was not until after the public announcement of this affiant that the doors of the said office were kept closed that they were opened, which was on the 11th day of April, 1848. This affiant has an office in the same building, and has also the charge of the Louisville library in the same building. The door to the library room is immediately opposite and across a passage from the door of the office of the People's line.

This affiant further states, that he had been repeatedly requested by Mr. Kendall in behalf of the patentees to render every assistance in his power to Mr. Loughborough in preparing for a suit against the line of telegraph aforesaid. That he exerted every honorable effort to find out what kind of an instrument the said line was using, and it was not until some time in the latter part of April or in May, that any tangible knowledge of the instrument could be obtained. To his certain knowledge, Mr. Kendall instructed Mr. Loughborough, as counsel for the patentees, to arrest the working of the line aforesaid by law, if it was attempted; and further, that, as far as he knows and believes, every effort has been made since to speed the trial now pending.

This affiant further states, that at one time he had given up all hope of ascertaining the kind of instrument that was used on the so-called

People's line, that he went to Mr. Loughborough and expressed his opinion that Morse's instruments were used, and desired to know of him if the doors of the office could not be unlocked by a writ of discovery; to which question Mr. Loughborough answered, that he would examine the law and ascertain.

This affiant further states, that he often told Mr. C. G. Oslere and Mr. E. L. Witman, and other agents of Mr. O'Rielly, that the patentees would bring suit against them as soon as they could find out what kind of an instrument they were using on the line; and he further states, that it was announced in the Louisville Journal that Mr. Loughborough was employed to bring suit against the line, and this editorial of the Journal was published long before the line worked successfully as heretofore stated, to Nashville, Tennessee, from Louisville, Kentucky.

This affiant further states, that he has been engaged in the telegraph enterprise more or less since August, 1846. In January or February, 1847, he procured the passage of a bill through the Kentucky legislature, for the right of way in Kentucky for telegraph lines. On the 23d of February, 1847, he was appointed agent at Louisville to procure stock for the lines of telegraph from the east to the west and the south, and had procured subscriptions to stock for Morse's telegraph before he ever heard of Henry O'Rielly. He further states, that about $24,000 was subscribed in Cincinnati in the course of three or four days before the 23d of February, 1847, and about $15,000 was subscribed in New Orleans for the same line, and near the same time. This affiant further states, that he could have raised at least $30,000, Louisville, Lexington, Frankfort, Shelbyville, Bardstown, and Glasgow, had Mr. O'Rielly not appeared as a conflicting party in the West. He further states, that he verily believes that Mr. O'Rielly has not $10,000 subscribed in Kentucky, after the most untiring exertions of his friends for several months, and that all or nearly all that has been subscribed was on the Morse's line, built by Mr. O'Rielly, running from Pittsburg to Louisville.

This affiant further states, that after he had generally circulated along the line to Nashville the circulars, containing the opinions of eminent lawyers aforesaid, at sundry times, both Captain John J. Rielly and C. G. Oslere aforesaid, stated to him that they did not care whether they had the right to use Morse's telegraph or not, that they had several other systems of telegraphing that they could use.

This affiant further states, that Dr. P. S. Bell is associate editor of the Louisville Courier, and he verily believes that said Bell is the author of nearly all the editorials in said paper relative to the telegraph since 23d of December, 1847. The publisher, W. N. Haldeman, has stated the above fact to affiant, and the same has been otherwise known to him. Dr. Bell was also the chairman of the Louisville committee, and the author of the report to the citizens of Louisville alluded to in Mr. O'Rielly's affidavit.

This affiant further states, that Messrs. Gholson and Davis and

Shaffner, &c., had the holes dug on the line from Louisville south as far as Bardstown, Kentucky, and the poles were delivered for about 20 or 25 miles. Messrs. Gholson and Davis provided means to pay the expenses of digging the holes aforesaid, and they paid the money to the boss or agent on the line to pay all the expenses of digging. Not one cent was furnished by Mr. O'Rielly. The poles furnished, Mr. A. L. Peay and others, tried to get the money from Gholson and Davis, but they failed about that time, September, 1847, and all hope was abandoned of getting the money from Gholson and Davis. The holes were dug for a line for House's or Morse's telegraph. They were paid for by Gholson and Davis, and this affiant had as much right, if not more, to those holes than Mr. O'Rielly, as he held the right of two-thirds which had been held by Gholson and Davis and this affiant, and the other third by Rielly; but as Gholson and Davis were largely indebted to Mr. O'Rielly, this affiant thought that it was just that he should have the benefits of the holes paid for by Gholson and Davis the fall before, and therefore this affiant set up no claim for them, which he might have done, and the poles furnished by Mr. Peay being red oak, they could not be used by this affiant.

This affiant further states, that Captain John J. Rielly and C. G. Oslere repeatedly stated to him, that Mr. O'Rielly would not have built, or attempted to have built, the line to New Orleans last winter, if it had not been for the publication of Mr. Kendall in the Louisville Journal in December, 1847; also, that Mr. Sanford J. Smith, an agent of Mr. O'Rielly, in St. Louis, about the middle of this month, stated to this affiant, that as soon as the publications of Mr. Kendall appeared in the Louisville Journal as aforesaid, that then Mr. O'Rielly determined to go on with the line from Louisville to New Orleans, and he said he knew he was right in the statement, because he furnished the money himself for the extension of that line from Louisville.

Affiant states further, that he verily believes that if Mr. O'Rielly had not commenced an opposition line to Morse's, from Louisville to New Orleans, the entire line of Morse's telegraph would have been completed before this day. The line has been completed to Memphis for several weeks, and it is progressing with energy to New Orleans; and affiant believes that it will be done as soon, if not sooner, than Mr. O'Rielly's line.

Affiant further states, that he believes that there were at least fifty miles of poles put up south of Nashville, on the line of Morse's telegraph aforesaid, before the 23d of December, 1847.

Affiant further states, that the prices of transmissions of messages on Morse's line, in the west, are as reasonable and moderate as the prices on the O'Rielly line; and he further states, that the patentees have never expressed a desire to increase them, and they have been disposed to concur with such prices as the friends of the line thought were of interest to the public.

Affiant further states, that the Morse's line from Louisville to Nash-

ville would have been completed weeks before it was, if the wire could have been obtained; and that the agents of O'Rielly boasted that affiant and his associate could not get the wire to complete Morse's line, as they had monopolized all the wire mills in the country; and that Capt. Rielly was much incensed when he learned that Worthington and Pullan, of Cincinnati, had agreed to furnish affiant and his associate with wire.

Affiant further states, that about the first of April, 1847, he was in Glasgow, Ky., and there saw in use on the O'Rielly line a relay magnet, (or receiving magnet,) and that messages have been sent and received by said magnet. There was no register used; messages were received by sound, and sent with a key common to Morse's instruments. And he further states, that he has heard the operators on the O'Rielly line frequently state that it was still in use there since it was seen there by this affiant. The said relay magnet is the same in form and principle as those attached to Morse's instruments, and was shown now in court; and said magnet was formerly used in connexion with Morse's instruments, either on the eastern or western lines of Morse's telegraph, at New Albany.

TAL. P. SHAFFNER.

August 31st, 1848.

MORSE, &c.
vs.
O'RIELLY, &c. } On the motion for injunction.

KENTUCKY, *sct.*

This the 31st day of August, 1848, Tal. P. Shaffner appeared before the undersigned, and made oath that the facts stated in the foregoing affidavit are true, as stated therein, to the best of his knowledge and belief.

THOS. B. MONROE, *J. P.*

The following is the circular and publications referred to in the above affidavit, to wit:

(Circular, to wit:)

Circular E.—Morse's Telegraph.

TO THE PUBLIC.

The annexed papers are my reply to the charges of fraud promulgated by Henry O'Rielly's paid advocates, in relation to his claim of a right to build Morse's telegraph on the Louisville, Nashville, and New Orleans line.

First come seven of the most respectable and responsible citizens of Nashville, acting as corporators of the New Orleans and Ohio Telegraph Company, incorporated by the legislature of Tennessee, who are able to build the whole line themselves twice over. Would they engage in a fraudulent enterprise? Next come the concurrent opinions of thirteen

Tennessee lawyers, embracing some of the most eminent in the Union. Have they given gratuitous opinions to aid in a fraud?

Next come five eminent lawyers of Kentucky. Have they, too, conspired to defraud Mr. O'Rielly?

Finally, I have shown, in a former publication, that Mr. O'Rielly and his associates themselves admitted, by their words and acts, that his contract gave him no rights on this line. Did they conspire to defraud themselves?

By this overwhelming authority, am I not fully sustained in pronouncing and denouncing the claim of O'Rielly to construct and use Morse's telegraph on this line as eminently fraudulent?

I ask every man to read the O'Rielly contract, hereto annexed, for himself, and see whether common sense does not sustain the opinions of the lawyers.

If those opinions be correct, O'Rielly and his hands have no more right to construct and use Morse's telegraph on this line, than they have to kill the farmers' horses and hogs along the road. A patent right is as much private property, under the protection of the Constitution and laws of the land, as a farmer's land, house, and stock. It is as unlawful to violate my patent as to burn my house; and every man who knowingly aids in it, by his money, his labor, or materials, exposes himself to the penalties of the law.

And these reckless men and their abettors may be assured that, if they proceed in defiance of all this authority, they will be stopped by the strong arm of the law as soon as its hand can reach them. Having no right to build Morse's telegraph, they have no right of way in Tennessee or Kentucky, and their posts are liable to be removed by the State or turnpike authorities.

The lawful owners of Morse's telegraph are now building it along this line with the utmost expedition. Numerous hands are at work between Louisville and Nashville; the posts will be going up in a few days; near fifty miles of beautiful red cedar posts are now up south of Nashville, and the work fast progressing; in fine, the line will be carried through to New Orleans as rapidly as it can be put up. Every city or town along the line that wants a telegraph station can get it, without patronizing fraud or plunging into law suits.

In a few days they will be invited to participate in this safe and profitable enterprise.

AMOS KENDALL,
Agent for Professor Morse and others.

January 15*th*, 1848.

Morse's electro-magnetic telegraph.

The undersigned corporators named in the act of the general assembly of the State of Tennessee, passed on the 18th of October, 1847, to incorporate the New Orleans and Ohio Telegraph Company, have submitted the contract, dated 13th June, 1845, between Henry O'Ri-

elly of the one part, and Samuel F. B. Morse, Alfred Vail, Leonard D. Gale, and Francis O. J. Smith, of the other part, by virtue of which the said O'Rielly claims the right to construct and use Morse's Electro-magnetic Telegraph on the line from Louisville, through Nashville, to New Orleans, to several distinguished lawyers, in order to satisfy ourselves and the public, and we have obtained from them a written opinion; which opinion, together with the contract in question, is hereunto annexed.

Having received from Prof. Morse and his copartners in the patent right, their obligation to convey to the company to be organized under the act aforesaid the exclusive right to use Morse's patents on the lines to be covered by the company, as soon as a line of one wire shall be constructed and in operation from Louisville, Kentucky, to New Orleans, we shall proceed forthwith to the exercise of the powers vested in us by the act of incorporation.

The success of Morse's telegraph on other lines is the best evidence of its great value upon the lines embraced in our act of incorporation; concentrating, as they will, by various branches, the entire telegraphic correspondence between New Orleans and the river and lake towns throughout the growing West. No investment now presenting itself promises a more speedy or munificent return, and we cannot but look upon it as entirely safe.

Under these circumstances we recommend the enterprise as one worthy of liberal encouragement at the hands of our fellow-citizens.

JOHN M. BASS,
JAMES WOODS,
JAMES A. M'CALISTER,
JAMES JOHNSON,
C. CONNOR,
G. M. FOGG,
J. J. GILL.

Nashville, Tenn., Jan. 10, 1848.

Articles of agreement for extending the electro-magnetic telegraph from the seaboard to the Mississippi and the lakes.

This memorandum of an agreement between Henry O'Rielly of the one part, and Samuel F. B. Morse, Leonard D. Gale, Alfred Vail, and Francis O. J. Smith, of the second part, witnesseth as follows:

That the said Henry O'Rielly undertakes, on his part, at his own expense, to use his best endeavors to raise capital for the construction of a line of Morse's Electro-magnetic Telegraph to connect the great seaboard line at Philadelphia, or at such other convenient point on said line as may approach nearer to Harrisburg, in Pennsylvania, and from thence through Harrisburg, and other intermediate towns, to Pittsburg, and thence through Wheeling and Cincinnati, and such other towns and cities as the said O'Rielly and his associates may elect, to St. Louis, and also to the principal towns on the lakes.

In consideration whereof the said parties of the second part agree and bind themselves, their representatives and assigns, that, when the said O'Rielly shall have procured a fund sufficient to build a line of one wire from the connecting point aforesaid to Harrisburg, or any points further west, to convey the patent right to said line so covered by capital, in trust for themselves and the said O'Rielly and his associates, on the terms and conditions set forth in the articles of agreement and association constituting the "Magnetic Telegraph Company, and providing for the government thereof."

The amount of stock, or other interest in the line to be constructed, reserved to the grantors and assigns, shall be one-fourth part only, and not one-half of the whole, on so much capital as shall be required to construct a line of two wires; but in all cases of a third wire, or any greater number, the stock issued on the capital employed for such additional wire or wires shall be divided equally between the subscribers of such capital and the grantors of the patent right, or their assigns. No preference is to be given to the party of the first part and his associates in the construction of connecting lines, nor shall anything herein be construed to prevent an extension by the parties of the second part, of a line from Buffalo to connect with the lake towns at Erie, nor to prevent the construction of a line from New Orleans, to connect the western towns directly with that city; but such lines shall not be used to connect any western cities or towns with each other which may have been connected by said O'Rielly.

In case of the sale of the entire patent right to the Government, the grantors shall be bound to pay the actual reasonable cost of the lines constructed under this agreement, with twenty per cent. thereon, and no more, and to vest the Government with the entire ownership of such lines; provided, as specified in the articles of agreement of the "Magnetic Telegraph Company," the purchase be made or provided for by Congress before the 4th of March, 1847 (eighteen hundred and forty-seven.)

The tariff of charges on the lines so constructed shall conform substantially to the tariff of charges on the great seaboard line before named, and in no case to be so arranged as to render the lines unequal in this respect to the prejudice of either.

Unless the line from the point of connexion with the seaboard route shall be constructed within six months from date to Harrisburg, and capital provided for its extension to Pittsburg within said time, then this agreement, and any conveyance in trust that may have been made in pursuance thereof, shall be null and void thereafter, unless it shall satisfactorily appear that unforeseen difficulties are experienced by said O'Rielly and his associates in obtaining from the State officers of Pennsylvania the right of way along the public works; and, in that event, the conditional annulment shall take effect at the end of six months after such permission shall be given or refused. And any section beyond said last point, embraced within the purview of this agreement, which shall not be constructed by said O'Reilly and his associates with-

in six months after said parties of the second part shall request said O'Rielly to cause said lines to be constructed so as to extend the connexion at least one hundred and fifty miles beyond said last point, and in like ratio during each succeeding six months thereafter; then, in relation to all such sections of the line, this agreement shall be null and void, provided, that such request shall not be made prior to the 1st day of April next, (1846.)

And the party of the second part shall convey said patent right on any line beyond Pittsburg to any point of commercial magnitude, when the necessary capital for the construction of the same shall have been subscribed, within the period contemplated by this agreement, by responsible persons, and not otherwise.

Done at the city of New York this 13th day of June, in the year of our Lord eighteen hundred and forty-five.

(Signed) HENRY O'RIELLY,
FRANCIS O. J. SMITH,
SAM. F. B. MORSE,
L. D. GALE,
By his attorney, S. F. B. MORSE.

NASHVILLE, TENN., *January* 6, 1848.

We having examined articles of agreement for extending the Electro-magnetic Telegraph from the seaboard to the Mississippi and the lakes, dated the 13th of June, 1845, between Henry O'Rielly of the one part, and Samuel F. B. Morse, Leonard D. Gale, Alfred Vail, and Francis O. J. Smith, of the other part, in order to answer the question submitted to us, whether said agreement authorizes said O'Rielly to construct a line of said telegraph from Louisville to New Orleans, or any intermediate points?

And we can say that we can find nothing in the contract conferring such authority on Mr. O'Rielly; but, on the contrary, it appears us, that the right to construct the line to New Orleans, and intermediate points, between that place and Louisville, is expressly reserved to said Morse and his associates.

R. J. MEIGS,
FRANCIS B. FOGG,
W. F. COOPER,
A. WRIGHT,
EDWIN H. EWING,
A. O. P. NICHOLSON,
W. H. HUMPHREYS,
ANDREW EWING,
JOHN MARSHALL,
WILLIAM P. BROWN,
EPHRAIM H. FOSTER,
EDWIN A. KEEBLE,
ROBERT S. CARUTHERS.

Opinion of Preston F. Loughborough, esq.

I have examined the articles of agreement between H. O'Rielly and Messrs. Morse, Gale, Vail, and Smith, dated at New York, 13th June, 1845; and, supposing them to be in force, my opinion has been asked upon their construction, in reference to the claim of O'Rielly and his associates to construct a telegraphic line from this city to New Orleans.

Their chief provisions are an undertaking on the part of O'Rielly that he will endeavor to raise capital for the extension of Morse's telegraph upon certain routes; and on the part of Morse and his associates, that when the funds shall be procured by O'Rielly they will convey the patent right of Morse in trust to be used upon the routes covered by these funds for the joint benefit of themselves and of O'Rielly and his associates, on terms and conditions not now necessary to be noticed.

The extension of the telegraph specified in the agreement to be made, pursuant to these provisions, are upon the line, from some point on the seaboard, through Harrisburg, Pa., to Pittsburg, and thence through Wheeling and Cincinnati, and such other towns and cities as O'Rielly and his associates may elect, to St. Louis, and also to the principal towns on the lakes.

From the general language used in reference to the latter end of the St. Louis line, as well as from the provisions in the second clause of the contract, it is obvious that some latitude of choice is given to O'Rielly in the selection of the towns and cities through which the wires may be placed from Cincinnati to St. Louis. He is not bound to go upon a right line, nor is he confined to those places which lie nearest to it. But in effecting the main connexion he may pass to the north and to the south of this line, and through towns and cities whose importance may promise to make their use of the telegraph profitable, and therefore desirable to be within the connexion. But if, as I think, the contract in this particular contemplates one line from the seaboard to St. Louis, not any number of lines, one connexion of Harrisburg with St. Louis, then this right of election to be exercised by O'Rielly has its reasonable limits, which he should not transcend. And these are indicated in the principle that the selection should be chiefly, at least with the view to the attainment of the main object, the connexion with St. Louis, not, in fact, (wholly losing sight of this object) for the purpose of establishing distinct connexions with other cities in order to obtain their business. Thus a telegraphic communication can be made between Cincinnati and St. Louis, by way of Huntsville, Mobile, and Little Rock; yet it would not occur to any one that such a line was intended by this agreement.

There is nowhere in the contract any stipulation that O'Rielly may raise funds for or claim an interest in any extensions of the telegraph to distinct points south of the line from Harrisburg to St. Louis. Such separate lines, branching off southwardly from the main line, were not, in my opinion, contemplated by the parties, nor are they embraced by the contract.

in six months after said parties of the second part shall request said O'Rielly to cause said lines to be constructed so as to extend the connexion at least one hundred and fifty miles beyond said last point, and in like ratio during each succeeding six months thereafter; then, in relation to all such sections of the line, this agreement shall be null and void, provided, that such request shall not be made prior to the 1st day of April next, (1846.)

And the party of the second part shall convey said patent right on any line beyond Pittsburg to any point of commercial magnitude, when the necessary capital for the construction of the same shall have been subscribed, within the period contemplated by this agreement, by responsible persons, and not otherwise.

Done at the city of New York this 13th day of June, in the year of our Lord eighteen hundred and forty-five.

(Signed) HENRY O'RIELLY,
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FRANCIS B. FOGG,
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ANDREW EWING,
JOHN MARSHALL,
WILLIAM P. BROWN,
EPHRAIM H. FOSTER,
EDWIN A. KEEBLE,
ROBERT S. CARUTHERS.

609.

Opinion of Preston F. Loughborough, esq.

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Their chief provisions are an undertaking on the part of O'Rielly that he will endeavor to raise capital for the extension of Morse's telegraph upon certain routes; and on the part of Morse and his associates, that when the funds shall be procured by O'Rielly they will convey the patent right of Morse in trust to be used upon the routes covered by these funds for the joint benefit of themselves and of O'Rielly and his associates, on terms and conditions not now necessary to be noticed.

The extension of the telegraph specified in the agreement to be made, pursuant to these provisions, are upon the line, from some point on the seaboard, through Harrisburg, Pa., to Pittsburg, and thence through Wheeling and Cincinnati, and such other towns and cities as O'Rielly and his associates may elect, to St. Louis, and also to the principal towns on the lakes.

From the general language used in reference to the latter end of the St. Louis line, as well as from the provisions in the second clause of the contract, it is obvious that some latitude of choice is given to O'Rielly in the selection of the towns and cities through which the wires may be placed from Cincinnati to St. Louis. He is not bound to go upon a right line, nor is he confined to those places which lie nearest to it. But in effecting the main connexion he may pass to the north and to the south of this line, and through towns and cities whose importance may promise to make their use of the telegraph profitable, and therefore desirable to be within the connexion. But if, as I think, the contract in this particular contemplates one line from the seaboard to St. Louis, not any number of lines, one connexion of Harrisburg with St. Louis, then this right of election to be exercised by O'Rielly has its reasonable limits, which he should not transcend. And these are indicated in the principle that the selection should be chiefly, at least with the view to the attainment of the main object, the connexion with St. Louis, not, in fact, (wholly losing sight of this object) for the purpose of establishing distinct connexions with other cities in order to obtain their business. Thus a telegraphic communication can be made between Cincinnati and St. Louis, by way of Huntsville, Mobile, and Little Rock; yet it would not occur to any one that such a line was intended by this agreement.

There is nowhere in the contract any stipulation that O'Rielly may raise funds for or claim an interest in any extensions of the telegraph to distinct points south of the line from Harrisburg to St. Louis. Such separate lines, branching off southwardly from the main line, were not, in my opinion, contemplated by the parties, nor are they embraced by the contract.

There is no provision which gives to O'Rielly and his associates an interest in any second line of telegraphic communication between Cincinnati and St. Louis, effected through towns and cities south of the first line that may be established by them under the contract. If, for instance, they have constructed a line from Cincinnati, by New Albany and Vincennes, to St. Louis, they cannot, I think, claim an interest in any other connexion running south of it.

The provisoes in the second clause of the contract do not, in my opinion, oppose the construction which I have given to it, which is in reference only to the main line to St. Louis and to the country south of it.

These views lead me to the conclusion that O'Rielly and his associates have no claim to be protected in any use they may make of Morse's telegraph upon the route from this city, by Bardstown, to Nashville or New Orleans. If this route were covered by the contract, the right of O'Rielly and his associates, according to its plain terms, would be, not to set up and use upon it for their own profit Morse's telegraph, but upon the subscription of capital for the line, to demand a conveyance of Morse's patent in trust to be used for the benefit of all the parties to the contract.

P. S. LOUGHBOROUGH.

LOUISVILLE, Ky., *Dec.* 24, 1847.

Opinion of the Hon. James Guthrie, of Louisville, Kentucky.

I have examined the agreement between H. O'Rielly and Messrs. Morse, Gale, and Smith, under date of the 13th of June, 1845, and being asked for an opinion as to the right of O'Rielly, under said agreement, to extend telegraphic lines south of the base line mentioned in said agreement from Pittsburg through Cincinnati, &c., to St. Louis, I am of opinion that the true and fair construction of said agreement does not give to the said O'Rielly any such right.

The language of the agreement is, "that O'Rielly undertakes on his part and at his own expense, to use his best endeavors to raise capital for the construction of a line of Morse's Electro-magnetic Telegraph, to connect the great seaboard line at Philadelphia, or at such other convenient point on said line as may approach near to Harrisburg, in Pennsylvania, and from thence through Harrisburg and other intermediate towns to Pittsburg, and thence through Wheeling and Cincinnati, and such other towns and cities as the said O'Rielly and his associates may elect, to St. Louis, and also to the principal towns on the lakes."

The undertaking of O'Rielly was to raise funds for the construction of a line, not lines, and that line was to extend from the great seaboard line through Harrisburg and other intermediate towns to Pittsburg, and thence through Wheeling and Cincinnati, and such other towns and cities as the said O'Rielly and his associates might select, to St. Louis, and also to the principal towns on the lakes. O'Rielly having raised funds and constructed the line through Harrisburg, Pittsburg, Wheel-

ing, Cincinnati, and intermediate towns, has made his election, and has no right under that contract to construct a second line through other intermediate cities and towns from the great seaboard line to St. Louis, and no right by additional *additional* lines to connect other towns not connected by the first line, except the line provided for in the agreement to connect the principle towns on the lakes.

The language of the clause of the agreement which sets out what O'Rielly was to do is not, in my opinion, enlarged by the language used in the agreement expressive of what the patentee was to do in consideration of O'Rielly's undertaking.

JAMES GUTHRIE.

December 28, 1847.

Opinion of Hon. O. G. Cates, Attorney General of Kentucky.

I have been requested to examine the contract for extending the electro-magnetic telegraphic from the seaboard to the Mississippi and the lakes, executed at the city of New York, on the 13th of June, 1845, by Henry O'Rielly, of the one part, and Samuel F. B. Morse and others of the second part; and that I give a written opinion as to the rights and powers of said O'Rielly and his associates, under said contract, to construct telegraphic lines from the cities of Cincinnati, Louisville, or St. Louis, to the cities of New Orleans and Mobile.

From the entire contract presented to me, it is evident that Morse and others had established a great seaboard line of telegraph, and on their part were anxious to procure funds in order to connect this seaboard line with the Mississippi river at the city of St. Louis, and thence to the lakes; and in order to secure that object they agreed with O'Rielly to confer on him and his associates certain rights, powers, profits, &c., invested in Morse and others, in virtue of their electro-magnetic telegraph patent.

With an eye to this one grand object of the parties the contract was executed in apparent good faith. Under the contract O'Rielly had the right and power (under certain named restrictions) to commence at the city of Philadelphia, or some other convenient point on the seaboard line, in order to reach Harrisburg; thence in a direction to Pittsburg, Wheeling, Cincinnati, and St. Louis, and thence to the principal towns on the lakes. It certainly was not contemplated by the parties that O'Rielly should construct his line on the nearest and most direct route from Harrisburg to Pittsburg and Wheeling; nor from thence to St. Louis by the way of Cincinnati; but a discretionary power was expressly reserved to him to make reasonable variations from a direct line as might best comport with his funds and the general profit of the parties to the contract. Nor was it contemplated by the parties that O'Rielly and his associates should diverge from the general course or route from Harrisburg to St. Louis, in such way or manner as to embrace the cities of Mobile or New Orleans. First, because neither of these cities

are within the route or range of the line to be constructed by O'Rielly. Second, they formed a part of the great seaboard line with which O'Rielly's line was to connect at Philadelphia, and not at any other point, except by the way of the lakes. Third, the western terminus of the O'Rielly line was St. Louis; and by the express words of the contract he was limited in his operations to the northern side of the main line, in order to connect with the towns on the lakes. Fourth, there is an express reservation in favor of Morse and others to extend a line from New Orleans so as to connect with towns in the west. Therefore, I am of the opinion that O'Rielly and his associates, under the contract before recited, have no right or power to construct a line or lines of electro-magnetic telegraph from any city in the west so as to connect with the cities of Mobile and New Orleans.

O. G. CATES.

Frankfort, Dec. 28, 1847.

Opinion of the hon. John M. Hewitt, formerly judge of Jefferson circuit court.

FRANKFORT, *Dec.* 28, 1847.

Having been requested to inspect a contract, dated at New York, 13th of June, 1845, between O'Rielly and Morse and others, touching a right of telegraphic communication from the Atlantic coast to St. Louis, I can only say that it appears clear to me that Mr. O'Rielly was at liberty to select a route from Pittsburg to St. Louis, such as suited him, without branches; and after so doing, his contract became completed and ended. The terms of the agreement show that it was a western communication which the parties designed to establish to St. Louis, reserving for future action the southern section of the United States, to which the attention of O'Rielly does not appear to have been directed; but it is a fair construction of the contract that Morse's associates did reserve to themselves the entire country not covered by the route to St. Louis.

JOHN M. HEWITT.

Opinion of the hon. Henry Pirtle.

LOUISVILLE, *January* 15, 1848.

I have carefully read a contract dated at the city of New York, on the 13th of June, 1845, between Henry O'Rielly of the first part, and Samuel F. B. Morse and others of the second part; and my opinion having been asked as to the right of Mr. O'Rielly, under this contract, to construct a telegraph line from this city to New Orleans, I say that I see nothing in this contract conferring such right. The object of the contract was to give him, with his associates, the right to construct "a line" from the seaboard to St. Louis, not in a direct mathematical line, or in the usual commercial route, but still a line to pass through Harrisburg, in Pennsylvania, to St. Louis, Missouri, "and also to the prin-

cipal towns on the lakes." Now, to extend this route to New Orleans would be as unauthorized by the liberty to diverge, given in this agreement, as a line would be from this city to Charleston, in South Carolina. Besides, it seems to me that the right to make the line "from" New Orleans, is expressly reserved to the parties of the second part in the agreement. HENRY PIRTLE.

☞ The line of telegraph now being constructed between Louisville and Lexington, and Louisville and Nashville; (as a part of the Ohio and New Orleans line of Morse's telegraph,) by Messrs. William Tanner, of Frankfort, and Tal. P. Shaffner, of Louisville, is the only line constructing under authority from the patentees of Morse's telegraph. The prompt and efficient manner in which they are proceeding will insure the speedy completion of the line.

Letter F.

(Letter F, to wit:) (For the Louisville Journal.) Morse's Telegraph.

Ohio and New Orleans line, via Wheeling, Maysville, Lexington, Louisville, Nashville, Tuscumbia, Vicksburg, Natchez, &c.

The above named line of Morse's telegraph is now in course of construction. The section between Louisville and Lexington has been completed and in operation. The section between Louisville and Nashville will be successfully working on or before the first of May. The wire is being stretched as fast as it can be manufactured. The section between Nashville and Mt. Pleasant, (sixty miles,) and the line from thence to Memphis, is now ready for the wire; the polls are all up. From New Orleans up the line is in process of construction, and will be completed as soon as the wire can be obtained from the manufactories. The section east of Lexington is being constructed as fast as possible. If not delayed for wire, the entire line from Baltimore to New Orleans will be completed by the 1st of September.

Prof. Morse and his associates have not resorted to fancy parades, music, feasting, and extensively "puffing" themselves in order to succeed. They have relied upon the merits of their invention; and they have not sought newspaper "puffs," nor have they divided "several systems of telegraphing" in order to succeed. The fact that there is not a line in the United States working with any other instrument but Morse's, is evidence of the virtue of their claims, and they do not require "puffs" and to advertise that they have "the right to use several systems of telegraphing." Of these fancy systems that have sprung into existence as additional wonders in the world, making followers by "puffs," "music," "suppers," "parades," &c., &c., with rapidity not equalled even by Millerism, Mormonism, or any other ism, there are five in number, viz:

House's, alias the American Telegraph.
Moss's, alias the Virginia Telegraph.
Pease's, alias the ——— Telegraph.

Davis's, alias the Great Western Telegraph.

Zook and Barries', alias the New Columbian Telegraph.

Of all these fancy telegraphs not one is now in operation. The last was tried on the Louisville and Nashville line, but it had to be taken off, and will probably be put on again with a little more of the Morse instrument than it had before. It had enough at first to insure a short life. When they are put on again it is hoped that the doors of the Louisville office will be unlocked, and the people permitted to see their new Columbian thing. The wire for this Columbian fancy has been up since the 22d February, but their new Columbian(?) has not worked so successfully as has been puffed by the papers, circulars, &c.

The following editorial, from the Nashville Union of the 3d of April, clearly demonstrates that this "new idea" telegraph is but another name for humbuggery. I cannot believe that the followers of this concern are conscious that they are humbugging the people, but I believe that they, in their zeal to injure Prof. Morse and his associates, are effectually humbugged themselves.

The Nashville Union, in answer to questions propounded, says:

"We were probably in error in stating that messages were "transmitted" from Nashville, but we stated what we believed to be the fact at the time. The line has not been in operation for the last two weeks.

"Our anxiety as a newspaper editor to get early news may possibly have made us too credulous, and have rendered us too sanguine relative to the working of Mr. O'Rielly's telegraph line, in stating that it realized all the expectations of its friends. We knew that messages were received, and supposed they could be sent, as a matter of course. But we admit that we 'congratulated our business friends' too soon. And thus having done all that 'fair play' can reasonably ask of us, we pledge ourselves to *ourselves to* print telegraphic despatches when we can get them, but to go into no more extacies, at least, at present."

The people in the South, and the editors in particular, are hereby informed, that all the lines of telegraph constructed by Mr. O'Rielly, north of the Ohio river, were constructed under a contract from the patentees of Morse's telegraph, and in every one Morse's instruments are used. The people in the South must not allow themselves to be deceived in this matter. A circular of a Charles Doane is capable of being construed to mean that all the lines built by Mr. O'Rielly are worked by this new Columbian idea. It is not so, and I repeat, that there is not a line in America worked by any other instrument but Morse's. And if this "Columbian" is put on again with Morse's relay magnet and other parts of his patent, their working will be promptly arrested.

TAL. P. SHAFFNER.

LOUISVILLE, *April* 7, 1848.

Letter (*G.*)

(Letter G, to wit:)

To the editors of the Louisville Journal.

I observe that an editorial notice, which appeared in your paper last

month, relative to Zook and Barnes' instruments on the O'Rielly telegraph line to Nashville, is used in the South as a recommendation of Mr. O'Rielly and his associates. Your editorial is now used as a guaranty of the successful working of this new instrument. I would be glad if you would state whether or not this instrument of Zook and Barnes' is or has been working successfully; and has it realized all that either you or the public anticipated?

TAL. P. SHAFFNER.

LOUISVILLE, *April* 7, 1848.

Thus called on, we feel it our duty to say, that thus far the instrument of Messrs. Zook and Barnes has not worked successfully. We understood at the time we wrote our paragraph in relation to it that it was working well, but there appears to be some mistake about the matter. We are told that the instrument, when first tried, transmitted a few messages from Nashville to Louisville, but that it failed, for some reason, to transmit from Louisville to Nashville; probably the magnet used at this place was weaker than that at Nashville.

Whilst making this statement, we are bound to add, that before this instrument was tried, the inventors, at least one of them, expressed strong apprehensions of its failure with the magnets then attached to it, on account of their weakness. The inventors would, before making a public experiment, have waited for the manufacture of stronger magnets but for their great anxiety to commence operations. Undoubtedly they have waited. We learn that they now have very powerful magnets, made by Dr. Smidt, of Cincinnati, and that they will be prepared to make trial of these in a day or two. We predict nothing as to the result. If it prove successful we shall say so, and if not, we shall say so.

(Letter H, to wit:)

Letter H.

(For the Louisville Journal.)

Louisville Courier on telegraph. Tal. P. Shaffner.—The Louisville Courier's editor comes out to-day with a column and a half of abuse of myself, in connexion with Morse's telegraph. He failed to answer, like a gentleman, the facts stated in my article on Saturday, and devotes himself, body and soul, (?) to personal abuse. The notorious editor of that paper has indulged in assailing my private character, and threatens further abuse.

All that I have to say at present is, that, in due time, I shall answer him in the manner he deserves, and his character shall be made known to the public distant from Louisville, that they may judge how far his foul and malicious statements are to be relied upon. I shall also call out the contract, exhibiting who were the members of the "anti-humbugging firm," alluded to in the Courier of to-day. In the mean time, I want the doors of the Louisville office, on the O'Rielly line to Nash-

ville, unlocked, and the instrument examined by those who are not paid to defend it.

TALL. P. SHAFFNER.

LOUISVILLE, KY.,
April 10, 1848.

(Affidavit of George C. Davis, to wit:)

Affidavit of Geo. C. Davis.

SAMUEL S. B. MORSE and others
vs.
HENRY O'RIELLY and others.

In equity, in the circuit court of the United States, for the district of Kentucky.

Affidavit of George C. Davis, of Cincinnati, in the State of Ohio.

This affiant states that, for several years past, he has devoted considerable attention to the subject of electricity and magnetism, and to their application to telegraphic purposes. He is well acquainted with the principles and mechanical arrangements embraced in professor S. F. B. Morse's system, called the "American Electro-magnetic Telegraph." He further states, he has examined a telegraphic instrument invented by Messrs. Barnes & Zook, and called the Columbian Telegraph, and which is now said to be employed on the "People's Line" of telegraph, from Louisville, Ky., to Nashville, Tenn. He has also read the affidavit of James F. Foss, describing the same. Sworn to before George W. Morton, commissioner, appointed by the United States circuit court for the district of New York, on the eighth instant, and examined the drawings thereto annexed, and finds the description and drawings, as far as they go, to be in accordance with the instrument examined by him.

This affiant further states it, as his opinion, that the two instruments above mentioned are nearly one and the same thing in their mechanical arrangements; and that the principal difference between them is in the application of the electric current to produce motion in the pen lever. In Prof. Morse's register, the reaction of the pen lever is produced by a spring; in the Columbian register, the same effect is produced by the introduction of a permanent magnet or magnets. An arrangement by no means in favor of simplicity and certainty of operation. There is also a difference in the receiving magnets of the two instruments. Prof. Morse using an "electro-magnet," strictly so called; while Messrs. Barnes & Zook make use of a permanent magnet, suspended within a helix for the purpose of opening and closing the circuit of electricity from the local battery. The difference between these two magnets involves a scientific question, which this affiant does not feel competent to explain.

This affiant further states that, being ignorant of the precise claims of Professor Morse, he is unable to state whether the instrument said to

be invented by Messrs. Barnes & Zook is an infringement of Prof. Morse's patent or not.

GEO. C. DAVIES.

Sworn and subscribed before me, this 18th August, 1848.

E. V. BROOKS, *J. P.*

STATE OF OHIO,
Hamilton county, ss.

I, Edward C. Roll, clerk of the court of common pleas, within and for said county of Hamilton, do hereby certify, that E. V. Brooks, esq., before whom the affidavit of George C. Davis, hereto attached, appears to have been made, was at the time of taking and subscribing the same an acting justice of the peace within and for the county of Hamilton, duly commissioned and qualified, and that full faith and credit are due to all his official acts as such; and that the signature of the said E. V. Brooks thereto is genuine.

In testimony whereof, I, the clerk aforesaid, have hereunto set my hand and affixed the seal of said court at Cincinnati, in the [L. S.] said county, this 18th day of August, A. D. 1848.

E. C. ROLL,
Clerk H. C. C. P.
By J. M. McMASTER,
Deputy.

STATE OF OHIO,
Hamilton county, ss.

I, William B. Caldwell, president judge of the ninth judicial circuit of the court of common pleas, within and for the State of Ohio, the same being a court of law and record, in and for the county of Hamilton, do hereby certify, that Edward C. Roll is clerk of said court, and was clerk at the time of making and subscribing the foregoing certificate; and James M. McMaster, his deputy, duly appointed and qualified; and that his attestation aforesaid is in due form of law; and that to all acts by him so done full faith and credit are and ought to be given, in judicature and thereout.

In testimony whereof I do hereto subscribe my name at Cincinnati, this 19th day of August, A. D. 1848.

WILLIAM B. CALDWELL,
President judge.

(Affidavit of Charles Carvill, to wit:)

Affidavit of C. Cargill.

The following affidavit of Charles Carvill was this day made, subscribed, and sworn to before me, a commissioner of the 8th circuit and Kentucky district of the United States, duly commissioned, and acting as such, at my office in the city of Louisville, in said district, to be read

in behalf of compl't in a certain matter of controversy now pending in the United States court in and for the said circuit and district, wherein S. F. B. Morse and others are compl'ts, and Henry O'Rielly and others are defendants. Deponent being personally known to me, of lawful age, and first duly cautioned and sworn to tell the truth, the whole truth, and nothing but the truth, doth depose and say:

That I am about fifty years of age; that I was a citizen of New York, and resided in that city till about six months last past, since which time I have resided in Louisville, Kentucky. I furthermore state, that, in November, 1832, a few days after Morse's return from Europe, he stated to me that he had invented a telegraph, by means of which intelligence might be transmitted verbatim thousands of miles almost instantaneously. That, in fact, it would communicate almost irrespective of time and distance. I suggested that I saw no other way that he could do it but by means of electricity. He replied that I was partly right, but that he had also to use other agencies or appliances. That, from my intimacy with Mr. Morse, I was cognizant, from time to time, of his persevering in the completion of the same. That in the year 1837 I was present at the public exhibition of his telegraph in the university of the city of New York, where it proved eminently successful over a very considerable length of wire. Furthermore, I state, that on the 11th day of March, 1848, I sent a telegraphic message through the office in Louisville, known as O'Rielly's, and by his line, for John Lockwood, of Lexington, to F. G. Macey, at Nashville, of ten words, for which I paid into O'Rielly's telegraph office to some clerk therein twenty-five cents. And on the 29th June, 1848, I sent in the same way, and by the same office and line, a message for Lindsey, of Frankfort, to Capt. Brook, at Memphis, of 11 words, for which 69 cents were paid to said office. And on the 18th August, 1848, a message for Charles B. Church, of Maysville, to A. B. Shaw & Co., at Memphis, of ten words, for which 65 cents were paid to said office. I have at various times between these dates sent other messages by the same line to Nashville and Memphis, and paid for them; and I have at various times received by said line, and from said office, messages purporting to have come from Memphis, the last of which, on the 22d August, 1848, from A. B. Shaw & Co., to be sent to McIlvain, at Maysville, for which I paid 65 cents.

I certify that said affiant swore to and subscribed the same before me, and that said affidavit was reduced to writing by me in affiant's presence, and carefully read to him in my presence.

W. S. PILCHER,
Comm'r.

CHAS. CARVILL.

The following are the depositions read by the complainants herein, to wit:

(Interrogatories, to wit:)

Interrogatories.

Circuit court of the United States, district of Kentucky.

Morse and others
vs.
O'Rielly and others. } In chancery.

Interrogatories to be propounded to witnesses on the part of the complainants.

1. What is your age, profession, and residence?

2. Are you acquainted with the invention called Morse's Electro-magnetic Telegraph? If yea, state when, where, and under what circumstances you became acquainted with it.

3. How did Prof. S. F. B. Morse propose to communicate intelligence at a distance? Was it by an evanescent sign, or by imprinting the sign at a distance?

4. Did or not Prof. Morse describe to you any apparatus or part of apparatus of a telegraph; if yea, when and where did he do so?

5. Did or not he ever show to you any apparatus or machine in operation; and if yea, when and where did he do so?

6. Please exhibit and annex to your deposition a drawing or drawings delineating the said apparatus or machine so shown to you; and describe the operation of the said machine?

7. Did or not Prof. Morse to your knowledge ever have or propose any other mode of marking signs at a distance; and if yea, what was the method, and when did he propose it?

8. Did he employ, or propose to employ, a single circuit or conductor, or more than one?

9. State whatever else you may know respecting the invention of Prof. S. F. B. Morse of the electro-magnetic telegraph, the dates, and all the particulars in relation to its inception, progress, and completion.

10. Have you read the letters patent of the United States issued to S. F. B. Morse on the 13th June, 1848, for a new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism (being a second reissue of the patent issued to said Morse originally on the 20th day of June, 1840,) together with the specifications thereto annexed? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, ex[h]ibits a description of the invention in such full, clear, and exact terms as would enable you [to] construct and use the same.

11. State whether or not in your opinion any person skilled in the art or science to which said invention appertains, or with which it is most nearly connected, would be enabled, from the specification and drawings annexed to the said letters patent, to construct and use said invention.

12. Have you read the letters patent issued to S. F. B. Morse on the 13th June, 1848, for an improvement in electro-magnetic tele-

graphs, being a reissue of a patent issued to said Morse on the 11th April, 1846, with the specifications annexed thereto? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the said patented improvement in such full and clear terms as would enable you to construct and use the same.

13. State whether or not in your opinion any person skilled in the art or science to which said patented improvement is most nearly connected would be enabled, from said last named specifications and drawings, to construct and use the said improvement.

14. State whether or not in your opinion the said last named specification does clearly and sufficiently shew in what said improvement consists, and distinguish what is new from what is old.

15. State what you may know respecting the erection of a line of telegraph by the defendant, H. O'Rielly, and those employed by him, from Louisville, Kentucky, to Nashville, Tennessee, when the same was built, what is the nature of said line, and what it was commonly called.

16. State in like manner what you may know respecting the building of a line of telegraph between the same points by or for the complainants, when it was done, and the nature of the same; when it was put it operation, and whether it has continued to operate.

17. State what you may know respecting the mode in which the defendants put and kept their said line in operation, and all the circumstances attending the same.

18. State the situation of the terminus and office of the defendants' said line in Louisville, and whether and when you visited the same.

19. Describe the apparatus and machinery you observed in the said office, and annex a drawing or drawings of the same, and explain as fully as you can the mode of its operation.

20. What was the said apparatus called, and whose invention was it said to be?

21. Have you at any time, and when, visited the office at the Nashville end of the line of the defendants? And if yea, describe the apparatus and machinery used in the said office for telegraphing as fully and clearly as you can, together with its mode of operation.

22. Were you present at the hearing before his honor the district judge of Kentucky, in August and September, 1848, of the motion for an injunction in this case? If yea, state whether any instrument for telegraphing was exhibited on the part of the defendants; and if yea, what was it called, and in what, if in any, respect did it differ from the instrument in the office of the defendants at Louisville?

23. Are you acquainted with the instrument called Barnes and Zook's telegraph, said to be invented by Barnes and Zook, and its mode of operation? If yea, state the extent of your knowledge upon this subject, and when, where, and how you acquired the same.

24. Are you acquainted with the inventions patented to S. F. B. Morse by the United States; have you read his patents issued on the

13th June, 1848; and have you seen his said inventions in operation?

25. Describe the telegraph of Morse and that of Barnes and Zook, embracing the whole of each machine, with all its parts, from the main battery to the register, describing the functions of each part, and annex to your answers such drawings of both the instruments as may be useful to explain them and facilitate the understanding of your answers.

26. Examine the drawings now exhibited to you, marked "drawings of Barnes and Zook's telegraph," with the explanatory notes, and having written your name and the date of taking this deposition thereon, please to state, upon such examination, or upon your knowledge of the instrument itself, from having seen the same, (naming which,) whether or not in your opinion the essential principles of the instrument of Barnes and Zook are the same as those of Morse's instrument.

27. Do the two instruments produce the same or different results upon the same or different principles?

28. If the instrument of Barnes and Zook differs in your opinion from that of Morse, what is the nature of these differences, and do they effect the essential principles of the two?

29. State whether in your opinion the essential principles of Morse's instrument, as patented, is or is not involved in that of Barnes and Zook.

30. If in your opinion the instrument of Barnes and Zook differs from that of Morse, as patented, do those differences in your opinion constitute any improvement?

31. State in what the two registering instruments appear to differ.

32. State in what do they appear to resemble each other.

33. State in what the two instruments called the mutator and the receiving magnet appear to differ, and in what they resemble each other.

34. What is the object to be attained by the separate pieces of apparatus in each instrument, the register, the mutator, and the receiving magnet?

35. What is the object to be attained by the combination of the two parts of the apparatus in each, to wit, by the combination of the register and the receiving magnet, in the one case, and the register and mutator in the other?

36. Is the power of electro-magnetism in the two instruments essential to put either of them in operation?

37. Are the permanent magnets in the Columbian essential to the ultimate end to be attained by both instruments, to wit, the marking of characters at a distance?

38. Would a spring be a mechanical equivalent for one of the permanent magnets, and a piece of soft iron an equivalent for the other?

39. Does the mutator and the receiving magnet accomplish the same result by substantially the same means?

40. Is there an advantage or a disadvantage in having the magnet move instead of the armature, in the mutator and register of the Columbian?

41. Is it or not a well established law of mechanics, that a less weight is moved with less force than a greater?

42. The mutator breaks and closes two local or "resident" circuits, while the receiving magnet breaks and closes but one; is the same end which is attained by each better secured by multiplying the circuits, or is the second a needless addition?

43. By Morse's receiving magnet, where a single local circuit is closed an electro-magnet is produced in that circuit which directly marks, by attracting an armature placed near the poles of the magnet. When the circuit is broken, and the magnetic attraction ceases, a spring returns the armature to its normal position. Is the second circuit of the mutator of any other use than to be an equivalent of the spring in the receiving magnet?

44. In the action of the electro-magnet with the permanent magnets, in the Columbian, is there not attraction as well as repulsion?

45. Would or not a piece of unmagnetic iron, placed in the position of one of the permanent magnets, and a spring substituted for the other permanent magnet, produce the same effects of attraction and repulsion, though it may be in less degree?

46. Is or not the object of both arrangements of electro-magnets in the two instruments the same, to wit, to obtain power to mark; and in Morse's arrangement is there any difficulty in obtaining more power than is necessary to accomplish that object?

47. Is there any advantage, in this respect, in the Columbian arrangement over the arrangement in Morse's; is there any disadvantage?

48. Is the contrivance of the permanent magnets any thing else than a less convenient mode of applying the electro-magnetic power?

49. How is the permanent magnet, often called the steel magnet, made magnetic?

50. How is the electro-magnet made magnetic?

51. Is or not the magnetic power or force of the steel magnet, and of the electro-magnet, essentially the same; if not, at what point, having regard to the de[n]sity of the metal magnetized, does electro-magnetism cease, and permanent magnetism commence?

52. Is it settled among scientific men, whether the attraction and repulsion of magnets are different forces or powers of the same force operating in different directions; are or are not both magnetic powers, and one as much so as the other?

53. What is meant among scientific men by the terms "a motive power?"

54. If the opposite poles of two permanent magnets of the horse-shoe form, having the same attractive and repulsive force, be placed near each other, and a piece of magnetized soft iron be suspended between them, will they produce any motion in that soft iron?

55. What is the most powerful magnetic force, the attractive or repulsive?

56. Is it possible to bring the two to act together, without more complicated machinery than is necessary to make one available?

57. By which of these forces are the receiving magnet and the register worked in Morse's Electro-magnetic Telegraph; if by the attractive force, does it not give sufficient power for the purpose of making sounds or signs for telegraphic purposes?

58. If more power were wanted, could it not be obtained in a more simple manner, by adding one or more cups to the local battery, than by introducing permanent magnets, and complicating the machinery for the purpose of bringing the repulsive force in aid of the attractive?

59. If a machine give sufficient power for the end to be accomplished, is it not a positive injury to make the machinery more complicated for the purpose of increasing the power?

60. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause? If yea, set forth the same more fully and at large in your answer.

Deposition of L. D. Gale.

The deposition of Leonard D. Gale, taken at the mayor's office in the city of Washington, in the District of Columbia, to be read in a suit now depending in the circuit court of the United States in the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

The deponent, aged forty-eight and duly sworn, in answer to interrogatories filed in said cause put to him, deposes and says:

Question 1. My profession is that of examiner of patents in the U. States Patent office, and my residence in the city of Washington, D. C.

2. I am acquainted with the invention called Morse's Electro-magnetic Telegraph since the year 1836. In the month of January, 1836, I was a colleague professor in the University of the city of New York with Prof. Samuel F. B. Morse, who had rooms in the University building on Washington square, in the said city of New York. That during the said month of January, of the year aforesaid, the said Morse invited me into his rooms in the said university, where I saw, for the first time, certain apparatus constituting his electro-magnetic telegraph. The object of being invited into said room by Prof. Morse, was to obtain some information relative to the kind of battery required to send electric currents through long distances.

3. It was in all cases printing permanent signs at a distance upon some recording substance, as paper, cloth, wood, or metal.

4. For this reply, see answer to question 2.

5. The first time I saw the telegraphic invention of the said Morse, I saw the apparatus in operation in the said Morse's rooms, in the University of the city of New York, in 1836.

6. The telegraphic apparatus when first seen by deponent, consisted of the following parts represented in sheet 1, of the drawings annexed.

First. A train of clock wheels, being a part of a common wooden clock, adapted by the said Morse to regulate the motion of a strip of paper or ribbon, formed of strips of paper pasted together end to end, and about one and a-half inch wide.

Second. Three cylinders or drums of wood, arranged as in the accompanying drawings of the apparatus, essentially as then used, in which A B C represent the cylinders of wood. A is the paper cylinder, from which the paper is unrolled, passing over the cylinder B to cylinder C, which is connected with and moved by the clock machinery D, which is the wooden clock of which I spoke, and which was moved by the weight E. A wooden pendulum F, of the shape delineated, was suspended over the centre of cylinder B, having its pivot at f. This pendulum had its motion at right angles, or across the paper, when the latter was in motion. In the lower part of the pendulum, through two cross pieces, was fixed a pencil case, carrying a pencil fitting loosely, so as to slide easily up and down, and kept in contact with the paper by the weight g. At h was a projecting shelf from the frame XX, upon which shelf was fixed the electro-magnet, while the armature to be attracted by the said magnet was fixed upon the said pendulum. The wires or conductors from the helices of the magnet passed one to one pole of a single pair galvanic battery I, while the other wire passed to a cup k, of mercury, at the port rule. The other pole of the battery was connected by a wire to the other cup of mercury l.

Thirdly. The port rule represented below the table. This port rule was a rude frame containing two cylinders LL, of about two inches diameter, and two inches long. One of them was turned by a crank, and they were connected by a band of green worsted binding about one inch and a-half in diameter. M was the rule, or composing stick, and was made by two small thin rules about two feet long, and placed side by side, but separated about the eighth of an inch from each other, forming a sort of trough, which I have elsewhere in an affidavit denominated a wooden type rod, with a groove in it for type, and in which the type were set up, (hereafter to be described,) the cogs of which type are seen projecting on the top of the rule M.

At N, two standards were raised from the sides of the long frame of the port rule, and united at the top, in which standard suspended the lever O O. At the end, or rather at one end, of this lever was a fork of copper wire, to be plunged when the lever is depressed into the two cups of mercury, k and l. The other end of the lever sustained a weight to keep that end down, and beneath the weight was a tooth like those upon the keys of a hand organ.

Fourth. There was a series of thin type metal, which Prof. Morse called type, and which he showed me also in drawings in a sketch book, which drawings he informed me he had made on board the ship. These are accurately represented in the subjoined drawing. They consisted of eleven pieces, having from one to five cogs each, except one, which was used as a space. The first five numbers consisted of from one to five cogs respectively, with a short space after; the second

five numbers consisted also of cogs from one to five respectively, but with a long space after, a space double the length of the first. The operation of the apparatus when used was this: suppose that the numbers 456, 320, and 4, were to be the number desired to be sent, the type 4, 5, and 6 were set up in the rule M; after which a space was put to separate the whole number from the next, and so on. The rule M was then placed upon the band of the port rule, and by turning the crank, the rule was sent gradually forward, the cogs of the type operating the lever OO, to break and close the circuit of the battery I. When the circuit was closed, the magnet h attracted the pendulum F, causing a movement of the pencil g, of about one-fourth of an inch. The pencil being in contact with the paper, if the paper moved in the direction of the arrow, or vice versa, a continuous straight line was marked upon the paper, while the pendulum was stationary either at one or the other limit of its motion; but when attracted by the magnet from one limit to the other, and suddenly released by the cessation of the magnetic force, it marked a V shaped point, as in the "example of imprinting in the drawing, and the successive breakings and closings of the circuit by the cogs of the type, caused the points to be impressed or marked upon the moving paper in the manner there shown. By reading the extremities of the V shaped points as points, the figures intended were readily recognised.

I further depose and say, that during the year (1836) eighteen hundred and thirty-six, and beginning of the year 1837, eighteen hundred and thirty-seven, the studies of Prof. Morse on his telegraph I found much interrupted by his attention to his professional duties, so that for several months the instruments remained as they have been described above. I understood that want of pecuniary means prevented Prof. Morse from procuring to be made such mechanical improvements and such substantial workmanship as would make the operation of his invention more exact.

I further depose and say, that in the months of March and April, 1837, eighteen hundred and thirty-seven, the announcement of an extraordinary telegraph on the visual plan, (as it afterwards proved to be,) the invention of two French gentlemen of the names of Gonon and Sewell, was going the rounds of the papers. From its wonderful and very pompous, as well as mysterious, pretensions, it was supposed that it could be no other than an electric telegraph, and the thought occurred to me, as well as to Prof. Morse and some others of his friends, that the invention of his electro-magnetic telegraph had somehow become known, and was the origin of the new telegraph thus conspicuously announced. This announcement at once aroused Prof. Morse to renewed exertions to bring the new invention creditably before the public, and to consent to an announcement of the existence of his invention. This was done in the New York Observer of April 15th, 1837. From April to September, 1837, Prof. Morse and myself were engaged together in the work of preparing magnets, winding wire, constructing batteries, &c., in the university for an experiment on a larger,

but still very limited scale, in the little leisure that each had to spare, and being at the same time much cramped for funds. The labors of Prof. Morse at this period were mostly directed to modifications of his instruments for marking, contriving the best modes of marking, varying the pencil, the pen, using plumbago and ink, and varying, also, the form of the paper from a strip of paper to a sheet.

The latter part of August, 1837, eighteen hundred and thirty-seven, the operation of the instrument was shown to numerous visitors at the university. It was early a question between Prof. Morse and myself where was the limit of the magnetic power to move a lever. I expressed a doubt whether a lever could be moved by this power at a distance of 20 miles, and my settled conviction was that it could not be done with sufficient force to mark characters on paper at 100 miles distance. To this Prof. Morse was accustomed to reply, "If I can succeed in working a magnet ten miles, I can go round the globe." The chief anxiety at this stage of the invention was to ascertain the utmost limit of distance at which he (Morse) could work or move a lever by magnetic power. He often said to me, "It matters not how delicate the movement may be; if I can obtain it at all, it is all I want." Prof. Morse often referred to the number of stations which might be required, and which, he observed, would add to the complication and expense. The said Morse always expressed his confidence of success in propagating magnetic power through any distance of electric conductors which circumstances might render desirable. His plan was thus often explained to me: "Suppose," said Prof. Morse, "that in experimenting on twenty miles of wire we should find that the power of magnetism is so feeble that it will but move a lever with certainty but a hair's breadth, that would be insufficient, it may be, to write or to print, yet it would be sufficient to close and break another or a second circuit twenty miles further; and this second circuit could in the same manner be made to break and close a third circuit twenty miles further, and so on round the globe." This general statement of the means to be resorted to, now embraced in what is called the "receiving magnet," to render practical writing or printing by telegraph through long distances, was shown to me more in detail early in the spring of the year 1837, (eighteen hundred and thirty-seven,) and I am able to approximate the date very nearly from an accident that occurred to me in falling on the ice formed of late snow in the spring of that year. The accident happened on the occasion of removing to Prof. Morse's rooms in the N. York University some pieces of apparatus to prepare a "receiving magnet" temporarily.

The apparatus was arranged on a plan substantially as indicated in the drawings, marked sheet 2, accompanying this affidavit. 1 is a battery at one terminus of a line of conductors representing 20 miles in length. From one pole of the battery the conductor proceeds to the helix of an electro-magnet b, at the other terminus, (the helix forming a part of the conductor;) from thence it returns to the battery end, terminating in a mercury cup O. From the contiguous mercury cup

p, the wire proceeds to the other pole of the battery 1. When the fork of the lever C unites the two cups of mercury the circuit is complete, and the magnet b is charged and attracts the armature of the lever d, which connects the circuit of battery 2 in the same manner, which again operates in turn lever e, twenty miles further, and so on. This I depose and say was the plan then and there revealed and shown to me by the said Professor Morse, and which, so far as I know, has constituted an essential part of his electro-magnetic telegraph from that date till the present time.

It was on Saturday, the 2d day of September, 1837, eighteen hundred and thirty-seven, that Professor Danberry, of the English Oxford University, being on a visit to this country, was invited with a few friends to see the operations of the telegraph in its then rude form in the cabinet of the New York city University, where it then had been put up with a circuit of 1700 feet of copper wire, stretched back and forth in that long room. I well remember that Professor Danberry, Professor Torry, and Mr. Alfred Vail, were present among others. This exhibition of the telegraph, although of very rude and imperfectly constructed machinery, demonstrated to all present the practicability of the invention, and it resulted in enlisting the means, the skill, and the zeal of Mr. Alfred Vail, who early the next week called at the rooms, and had a more perfect explanation from Prof. Morse of the character of the invention. The doubt to be dispelled in Mr. Vail's mind as he then stated, and has since frequently stated, was whether the power of magnetism could be propelled to such a distance as to be practically effective. This doubt was dissipated in a few minutes conversation with Prof. Morse, and I have ever been under the full conviction that it was the means then disclosed by Prof. Morse to Mr. Vail, to wit, the plan of repeating the power of magnetism at any distance required, which I have stated, that induced Mr. Alfred Vail, and his brother George Vail at once to interest themselves in the invention, and to furnish Prof. Morse with the means, material, and labor for an experiment on a larger scale. From this time commenced the operations at the iron works at Speedwell near Morristown, New Jersey, where was made the instrument which showed to Congress in the commencement of the year 1838, eighteen hundred and thirty-eight, the operation of the electro-magnetic telegraph of Professor Morse.

LEONARD D. GALE.

7. Professor Morse did propose to use a chemical telegraph on the same principle as that recently reissued to him in letters patent, dated April, 1849, and with which Bain's recent patent was found to interfere. This plan was shown me by Professor Morse in 1837, and illustrated by drawings showing different materials and plans of accomplishing the object. But from the difficulties encountered in selecting materials that would give satisfactory results, the further consideration of the subject was postponed for a more favorable opportunity, and leisure

to investigate it. Besides the electro-magnetic telegraph was always considered the most valuable invention by him.

8. Professor Morse never to my knowledge used or proposed to use more than a single wire in any of his plans for telegraphing.

9. In answer to question 9. I have already annexed in reply to question C all the points that I suppose to be important relative to this question.

10. I believe the specification of Morse's reissue of his letters patent for improvements in electro-magnetic telegraph, dated 13th June, 1848, is both full and specific, and fully answers all the requirements of the patent laws.

11. I believe the specification referred to in question 11 is sufficiently described to enable any one skilled in the arts to which the invention appertains to construct, as well as understand, the devices involved in the invention.

12. To the 12th question asking whether I regard the specification of Morse's reissue of 13th June, 1848, as given in such full and clear terms as would enable me to construct and use the same, I reply in the affirmative.

13. To the 13th question on the same subject I also reply in the affirmative.

14. I know nothing personally of this subject.

15. I reply the same as to question 14th.

16. Reply the same as to question 14th.

17. Reply the same as to question 14th.

18. Reply the same as to question 14th.

19. Reply the same as to question 14th.

20. Reply the same as to question 14th.

21. Reply the same as to question 14th.

22. Reply the same as to question 14th.

23. I have not seen the instrument referred to in 23d question.

24. To the 24th question I answer in the affirmative.

25. To question 25 I depose and say, I have not examined the instruments called Barnes and Zook, knowing it to be theirs.

For a just and accurate description of Morse's invention reissued on the 13th June, 1848, and numbered reissue 117, I refer to the printed copy of the reissue hereto annexed, with drawings, to wit:

[Here read the reissue No. 117 of the Patent office record.]

26. I have examined the drawings and explanations annexed hereto, and marked [A] and denominated "Barnes and Zook's telegraph" and written my name thereon and the date of this deposition, and do depose and say, from my personal knowledge of Morse's invention of his electro-magnetic telegraph, and from the drawings and explanations of the so-called Barnes and Zook's telegraph hereto annexed, that I consider the receiving magnet in Morse's telegraph as operating on the same principle as the mutator in the telegraph of Barnes and Zook, as

the drawings hereto annexed represent. Morse's receiving magnet, which constitutes the most valuable part of his invention consists of a device or contrivance by which the galvanic current of one battery is made to set off, or set in motion, a current in a second battery, and this in turn may start a current in a third battery, and so on through any number of batteries, and for any distances that may be required, however great. Now, if the principle of Morse's receiving magnet has been given correctly, the answer to a single question must decide the main question, namely, whether the instruments called Barnes and Zook's are the same in principle as Morse's? The single question is this: Do Barnes and Zook in the operation of their instrument use one current of electric fluid, one circuit, one battery, or one magnet, to set in motion a second current, circuit, battery, or magnet? If they do, the identity of principle must be admitted. The explanations of the instrument represented in fig. 1 of the drawings hereto annexed, show that the moveable upright C of the electro-magnet K, when brought into contact with the metallic wire S, closes or sets in motion a local circuit or battery, and hence performs the same office as the receiving magnet of Morse's telegraph. Again, it is shown from the same explanations above, that the upright C of the electro-magnet K is brought into contact with the wire t, for the purpose of breaking one local current of electricity, and closing or setting in motion another local current. Whatever, therefore, be the movement of the upright C, the design of that movement is to set in motion or to break a second circuit or current of the electric fluid, and hence performs the same office and involves the same principle as the receiving magnet of Morse's invention. I have also examined the drawings on the sheet marked [C] representing what is said to be a modification of the Columbian of Messrs. Barnes and Zook, shown in sheet A, in which the movement of the pen point c, c, (fig. 2) is performed by having the electro-magnet F F vibrated backwards and forwards, between magnets G G and H H, on a railway supported by rollers, instead of suspending the electro magnet, or the moving part of it, on a fulcrum or hinge, as is done in Morse's pen, or recording apparatus. This substitute of railway and rollers for vibration on fulcrum does not in any way affect the character or principle of the machine, except, that in the Columbian an inferior mechanical device has been substituted for a superior one.

Neither of these devices by itself is new; both are well known in all kinds of machinery. Nor could the one or the other be claimed as the subject of letters patent, except where palpable evidence of invention is manifested in applying them to practical purposes.

27. For reply to 27, see answer to 26.

28. For reply to question 28, see answer to question 26.

29. For reply to question 29, see answer to question 26.

30. The instrument of Barnes and Zook is more complicated than that of Morse, and of course more liable to derangement. The latter, on the contrary, is more simple and more certain.

31. The register of Barnes and Zook appears to differ from that of Morse by having its electro-magnet F F (see drawings of Barnes and Zook, fig. 2) moveable, and placed between the poles of two permanent magnets G G, H H, of fig. 2, the last named. Morse uses a simple electro-magnet, (see drawings of reissue, No. 117, example 10, fig. 4) C with its keeper f, the latter being suspended on a fulcrum at a, to move freely while the electro-magnet is fixed.

Thus in Barnes and Zook's instrument the moveable part is the electro-magnet, and in Morse's it is the keeper.

32. The two instruments resemble each other in this: both are moved by the electro-magnet, and in the same way. The electro-magnet being the prime mover and indispensable, and the only indispensable part of the instrument.

33. For reply to this question, see reply to question 26.

34. The object of the register in both instruments is to record the intelligence sent. It is in both instruments worked by a local battery, and situate at the end of the line opposite that of the operator. The object of the mutator and of the receiving magnet is the same, namely, the application, by a delicately suspended lever, of feeble electric currents through a long distance to set in motion a more powerful current in a local circuit at a distance from *from* the operator, and which local circuit is controlled by the operator.

35. For reply to this read answer to question 34.

36. Read the answer to question 32.

37. For reply, see answer to question 32.

The permanent magnets are not only not necessary but are an absolute objection, rendering the instrument complicated and liable to derangement.

38. Answer to question 38 is that a spring on the one side and the balance keeper on the other side are the proper equivalents for the permanent magnets here used.

39. The answer is in the affirmative.

40. There is a decided disadvantage in having the magnet move instead of the armature, arising from the greater weight and the consequent sluggishness of the motion.

41. Answer in the affirmative.

42. I am satisfied that the two circuits with the mutator are not only of no advantage, but that the instrument is rendered more complicated and less useful thereby.

43. Answer to question 43 is, that the second circuit of the mutator acts as the spring does in the receiving magnet of Professor Morse.

44. There is attraction and repulsion both.

45. I reply that it would produce the same effect if a piece of unmagnetized iron in the place of one permanent magnet were used, and a spring in place of the other.

46. The object of the electro-magnet in the Columbian and in the Morse telegraph is the same, and there is no difficulty in obtaining all the power that is needed.

47. Morse's arrangement has the advantage of simplicity of arrangement, lightness of materials used, and rapidity of execution.

48. It is a use of mechanical power at great disadvantage.

49. How is the permanent magnet formed, is answered by saying that there are several modes of doing it. One is to place the unmagnetized steel bar within a coil or helix of copper wire, along whose length a current of electricity is flowing from end to end; the bar is immediately converted into a permanent magnet. Another method consists in rubbing over the unmagnetized bar with the poles of a permanent magnet.

50. Answer the same as that stated in the first part of answer to question 49.

51. They are evidently the same in kind. The softer the metal the shorter the time it will retain the magnetism, and the harder and the nearer it approximates to steel, the more permanent will be its magnetism.

52. Answer. Attractions and repulsions are generally considered as produced by electric currents running in different directions. If one pole of a temporary magnet were made to attract an opposite pole of another magnet, when the electric current is circulating around the first in one direction, reverse the direction of the current, and the pole which attracted will now repel.

53. Motive powers are such as are found in nature and rendered controllable by man, as wind, water, steam, electricity, animal power, &c.

54. Answer. Yes; the soft iron will be attracted to one or the other.

55. Answer. The attractive force.

56. It would be difficult, but I should not think it impossible.

57. Answer. They are worked by the attractive power; it supplies all the power that is required.

58. If more power were required, the size of the local battery might be increased; this is the best mode of increasing the power.

59. The reply to question 59 is in the affirmative, most certainly.

60. I have nothing further to add relative to the subject herein set forth.

LEONARD D. GALE.

I, William W. Seaton, mayor of the city of Washington, in the District of Columbia, certify that, on the 9th day of May, in the year of our Lord one thousand eight hundred and forty-nine, by virtue of a commission issuing from the circuit court of the United States, for the district of Kentucky, hereto annexed, I called and caused to come before me, at my office in the city aforesaid, Edmund Burke, Leonard D. Gale, Charles G. Page, George Wood, E. Goodrich Smith, and Lewis H. Schneider, all of said city, witnesses for the complainants in a suit depending in said court, in which Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants; and the said Edmund Burke, Leonard D. Gale, Charles G. Page, George Wood, E. Goodrich Smith, and Lewis N. Schneider, being

severally by me first duly sworn and diligently examined on oath, touching the premises, upon the interrogatories annexed to the aforesaid commission, did each write down in my presence the several answers subscribed in his name; and that they, the said Edmund Burke, Leonard D. Gale, Charles G. Page, George Wood, E. Goodrich Smith, and Lewis H. Schneider, did respectively subscribe their names in my presence, each to his respective deposition.

In testimony whereof I have hereunto subscribed my name, and caused the seal of said city to be affixed, the day and year above written. [L. S.]

W. W. SEATON, *Mayor.*

Attest: WM. J. McCORMICK, *Register.*

Deposition of E. Burke.

(Deposition of Edmund Burke.)

The deposition of Edmund Burke, taken at the mayor's office, in the city of Washington, in the District of Columbia, to be read in a suit now depending in the circuit court of the United States for the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

The deponent, being aged forty years, and duly sworn in answer to the interrogatories filed in said cause put to him, deposes and says:

To the first interrogatory I answer, my age is forty years and upwards; that my profession is a counsellor-at-law, but now filling the office of commissioner of patents of the United States; and that my residence is Washington city.

In reply to the sixtieth and last interrogatory, I answer, that I appointed Leonard D. Gale first to the office of assistant examiner of patents, and subsequently to the office of principal examiner of patents, in the Patent office, which latter office he now holds; and that all the facts set forth in the communication hereto annexed, dated Feb. 22d, 1849, signed by me, and addressed to the Hon. James Buchanan, then Secretary of State of the United States, are to my best knowledge and belief true. I therefore make the said communication a part of this my testimony, hereby testifying and deposing to all the facts therein stated, so far as they purport to have been stated from my own personal knowledge.

To the interrogatories numbered from 2 inclusive, to 59 inclusive, not having sufficient personal knowledge of the matters to which they relate, I have nothing to answer.

EDMUND BURKE.

UNITED STATES PATENT OFFICE,
February 22d, 1849.

SIR: In reply to your letter of the 22d inst., enclosing the resolution of the Senate "calling for a report of the circumstances attending the appointment of Leonard D. Gale as an examiner in the Patent office,

with copies of papers relating thereto," I have the honor to enclose herewith copies of the papers required, and to submit the following statement of facts relating to the appointment of Dr. Gale.

In the month of September, 1846, Henry D. Stone, an assistant examiner in the Patent office, died. I was then absent on a visit to my old place of residence in New Hampshire.

While I was there I received a letter from Henry H. Sylvester, esq., then and now chief clerk of the Patent office, informing me that Mr. Kingsley, of the firm of Kingsley & Pirson, patent solicitors of that city, was then, or had been, in Washington, and had recommended Leonard D. Gale, of New York, as a proper person to be appointed in place of Mr. Stone, deceased. I think Mr. Sylvester, at that time, or very soon after, enclosed a letter of Mr. Kingsley's to me, recommending Dr. Gale for the vacancy in question. At that time I had no acquaintance whatever with Dr. Gale; in fact I had never seen nor heard of him. I replied to the letter of Mr. Kingsley, and appointed a day for an interview with Dr. Gale in New York, on my return to Washington. I arrived in New York in October following, and met Dr. Gale at the office of Kingsley & Pirson, No. 5 Wall street. I was introduced to him either by Kingsley or Pirson, and had a short conference with him in relation to his appointment.

At that interview I was favorably impressed with his appearance, and made up my mind that I would appoint him, and so said to him.

Previously, however, I had been informed by Messrs. Kingsley & Pirson of his qualifications and standing as a man of science, and felt convinced that I was making a valuable acquisition to the scientific branch of the service of the Patent office for the salary, which was then but $1,250 per annum.

But before leaving Dr. Gale I suggested to him the propriety of fortifying himself with recommendations from men of science and influence, inasmuch as his appointment could not be made without the approbation of the Secretary of State, who would undoubtedly wish to be convinced that he was a proper person for the office to which I designed to appoint him. I returned immediately to Washington, and found in the Patent office, or soon after received, recommendations from Professor Renwick of Columbia College, New York, Seth Staples, esq., a distinguised consellor of the same city, Professor Morse, and Hon. Amos Kendall. I thereupon nominated Dr. Gale for the office of assistant examiner of patents, and sent the nomination, with the letters above named, to you for confirmation. I made the nomination on the 12th day of October, 1846, and you approved it on the 17th day of the same month.

The appointment, with the letters above mentioned, were then returned by you to me, and were by my order placed upon the files of the Patent office, where they now remain. In relation to this first appointment I had no communication whatever, in writing or personally, with any person or persons except the chief clerk of the Patent office, Messrs. Kingsley & Pirson, and Dr. Gale.

After the passage of the act approved May 17, 1848, increasing the force of the Patent office, it became necessary for me to appoint two additional examiners, and two assistants. Dr. Gale who was then an assistant examiner, and who had filled that office from his appointment in October, 1846, made an application to me in writing for the office of examiner. After mature deliberation, and with a full knowledge of his talents, acquirements, capacity, and character, derived from nearly two years daily official and personal intercourse with him, I came to the conclusion to give him the appointment. And accordingly on the 28th of June, 1848, I sent to you a written nomination of him for the office of examiner, which you approved on the 30th day of the same month. No one recommended him for this second appointment, either verbally or in writing, nor did I consult with any one in relation to it; on the contrary, I appointed him from my own knowledge of his fitness and character as before stated. Under such circumstances the recommendation of others was not necessary. And if any written recommendations were communicated to you with the nomination, they must have been the old ones, or part of them, on file in the office. I am not aware that any were sent to you on that occasion, but probably the clerk who was directed to attend to the business may have communicated to you the papers filed on the occasion of the former appointment.

Very soon after Dr. Gale's appointment in 1846, it came to my knowledge that he was interested in the patent for Morse's telegraph. I sent for him to come to my room, and inquired of him if such was the fact. He answered in the affirmative, but said he was then taking, or should immediately take, measures to dispose of his interest in the patent. I told him that his position in the Patent office rendered such a course expedient, although he might legally retain an interest in a patent acquired previously to his appointment. He said he should take measures to dispose of it immediately, and did dispose of it in the course of a few weeks afterwards, as the records of the Patent office show.

If I had known that he was interested in Morse's patent before I appointed him in 1846, I should have, notwithstanding, given him the appointment on his disposing of his interest in the patent, or agreeing to dispose of it, as soon as he could do it without prejudice to his interest.

It is proper to remark that in his position as assistant examiner, it was never his province nor duty to decide upon the claims of patentees for any invention. And since he has filled the office of examiner he has had nothing whatever to do with applications for improvements in the telegraph, that class of inventions having been assigned to another desk.

In connexion with this subject I deem it proper also to say, that a letter signed C. B. Moss, representing himself as the agent of Henry O'Rielly, dated July 1st, 1848, and addressed to the Secretary of State, protesting against the appointment of Dr. Gale to the office of examiner, and asking to be furnished "with official copies of the application

and recommendation of Leonard D. Gale for the office he now holds; and also with official copies of the application and recommendation of Leonard D. Gale for the appointment of examiner under the new law," was referred by the State Department to this office.

I directed the letter to be placed on file with the other papers relating to the appointment of Dr. Gale, and also ordered copies of all the papers asked for by said Moss to be prepared for him on payment of the fees required by law for such copies; the only terms on which copies are furnished by this office to persons applying for them.

My impression is that Mr. Moss never called for the copies which he requested.

Copies of any papers relating to the appointment of Dr. Gale, existing in the office, have never been refused.

These are all the facts within my knowledge and recollection bearing in any degree upon the two appointments of Dr. Gale. Enclosed are copies of all the papers in this office, of which I have any knowledge, relating to this matter.

Statements by Col. Sylvester, the chief clerk of the Patent office, and by Dr. Gale, are also submitted, showing the circumstances under which Dr. Gale's first appointment was made.

In conclusion, I deem it due to Dr. Gale to say, that I have entire confidence in his integrity, as well as capacity for the office which he now holds. And I have no hesitation in affirming that if insinuations are thrown out tending to induce an impression upon the public mind that he is not a man of integrity, and that he executes the trusts confided to him in the Patent office corruptly, they have, in my opinion, no foundation whatever, except in the imaginations of those who make them.

I have the honor to be, very respectfully, your ob't serv't,

EDMUND BURKE.

To the Hon. JAMES BUCHANAN, Secretary of State.

(Deposition of Charles G. Page, to wit:)

Deposition of C. G. Page.

The deposition of Charles G. Page, taken at the mayor's office, in the city of Washington, in the District of Columbia, to be read in a suit now depending in the circuit court of the United States, in the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants. The deponent being of lawful age, in answer to the interrogatories filed in this cause, answers and says:

1st. I am examiner in the Patent office, and reside in the District of Columbia, and am thirty-seven years of age.

2d. I believe the first knowledge I had of Morse's telegraph was from a description given in Silliman'sJournal.

3d. The telegraphic communications were marked in certain signs or characters upon paper.

4th. I do not remember of any particular description given to me by Prof. Morse in person.

5th. I first saw the telegraph in operation at the Capitol. The precise time I do not remember.

6th. The operation of the telegraph at that time consisted in sending intelligence from one room to another distant room in the same building. The intelligence or messages sent were imprinted upon strips of paper, which was kept in motion while the telegraph was in operation. The motion, I believe, was produced by clock work. The signs upon the strip of paper were printed by a pen connected with a lever which was attached to the armature of an electro-magnet, and which was moved with or by the armature whenever the electro-magnet was charged or discharged. When the magnet was charged the armature was attracted by it, and when the magnet was discharged the armature was drawn away from it by means of a spring connected with the lever. The charging and discharging of the magnet was made at the will of the operator, according to the kind of sign he wished to impress upon the paper, and this he effected by a metallic style held in the hand, the motions of which were regulated according to the kind of sign to be produced. The style was in connexion with one extremity of the telegraphic wire or circuit, and a galvanic battery was in connexion with the other extremity of the wire or circuit by one of its poles; connected with the other pole of the battery was a small cup or cavity containing mercury. When the operator wished to charge the electro-magnet the style was brought into contact with the mercury, and removed from the mercury whenever he wished to discharge the magnet. The signs imprinted were lines or dashes and dots. When a line or dash was to be made, the operator held the style in contact with the mercury for some perceptible time, and when a dot was to be made, the style and mercury were in contact for an instant only. The same results were also shown by bringing the style into contact with a solid conductor in place of the mercury. As the strip of paper was moving continually during the transmission of a message, it was evident that, as the pen was held in contact with the moving paper so long as the electro-magnet was charged, if the charge were prolonged, a line would be made upon the paper the length of which would depend upon the duration of the charge or the velocity with which the paper moved, and a single instant of contact with the style and mercury would produce a mere dot or point upon the paper, which, during the discharge of the magnet the pen being withdrawn from the paper by the action of the spring upon the pen lever, a blank space would be left between the signs. My recollection of the details of the apparatus, the form and position of parts, is not sufficiently clear to enable me to make drawings, but I believe I have described all the essential features as I then saw and understood them.

7. Prof. Morse proposed several years since, when I do not remember, to mark signs at a distance by electro-chemical action.

8. He proposed to employ a single circuit, and more if necessary.

9. The telegraph of Prof. Morse was in operation, to the best of my knowledge and recollection, in the spring or summer of 1844, between Washington and Baltimore, but I do not recollect the time of its commencement or completion.

10. I have read the patent referred to in the tenth interrogatory, and believe it to be sufficient to enable me to construct and use the invention.

11. I believe said patent also sufficiently clear and exact to enable any person skilled in the art to make and use the invention.

12. I have read the patent referred to in the 12th interrogatory, and believe it to be sufficient to enable me to construct and use the invention.

13. I believe said patent clear enough to enable any person skilled in the art to construct and use the invention.

14. I think the last named specification clearly sets forth and distinguishes the invention.

To the 15, 16, 17, 18, 19, 20, 21, 22, 23d interrogatories I have no answer to make, having no knowledge of the matters of inquiry contained in the same.

24. I have examined all the patented inventions of S. F. B. Morse, and read the letters patent of the same, and seen the inventions in operation.

25. I have already described, in reply to interrogatory 6, Morse's telegraph, with the exception of the relay or receiving magnet, which has been introduced since I first saw the telegraph. As the operations of the telegraph at that time were confined to a short circuit from one room to another, a small battery and a single electro-magnet gave sufficient power for the purpose. When the circuit was extended to a great distance, it would have required a very large and powerful battery to operate the registering or printing magnet with the requisite force, and this difficulty was obviated by the intervention of the receiving-magnet, as it is called. This part of the invention, or improvement, consists in making the feeble movements of the armature of the electro-magnet at a distance, or through a great length of circuit, to perform the office of bringing into operation another magnet, which has all the requisite power from the fact that it is charged by a battery in close proximity and through a comparatively short circuit. Thus, each time the operator charges the receiving-magnet, the motion of its armature is made to complete a galvanic circuit around the second, or local, or registering magnet, as it is variously called, and the motions of the armature of this magnet will correspond with those of the armature of the receiving-magnet. I have no knowledge of Barnes and Zook's telegraph.

26. Upon examination of the drawings shewn to me, and marked as Barnes and Zook's telegraph, I think the essential principles of the invention are the same as those of Morse's telegraph, whether as shewn in the drawing (C) or drawing (A.)

27. The instruments produce the same results upon the same general principles.

28. The instrument of Barnes and Zook's differs from that of Morse in construction, and in some of the details of operation, but it brings about the same result, and upon the same general principle of action.

29. The essential principle of Morse's telegraph is involved in that of Barnes and Zook.

30. The instrument of Barnes and Zook does not appear to me to be an improvement.

31. The registering instruments differ in these respects: that where Morse uses the motion of the armature of an electro-magnet to imprint the signal, Barnes and Zook use the motion of the electro-magnet itself for this purpose, substituting for the armature the steel or permanent magnet; and where Morse uses a spring to effect one motion of his armature, Barnes and Zook use another steel magnet, and change the poles of the electro-magnet by changing the direction of the galvanic current.

32. The instruments resemble each other in that they both depend for their action upon the electro-magnetic power or force, and they both cease to act when this power or force is not applied to them.

33. The mutator differs from the receiving magnet in that the electro-magnet moves in the mutator, while in the receiving magnet the magnet is stationary; and that in the mutator a permanent magnet is substituted for the armature used in the receiving magnet, and also in the fact that in the mutator the electro-magnet has the freedom of motion in the coil which surrounds and charges it; while in the receiving magnet the magnet has no such mobility, the coil being wound closely upon it.

34. The object to be obtained by each piece in the mutator, register, and receiving magnet, has been fully stated in the answers to interrogatories 31 and 33.

35. The object to be obtained by the combination of the receiving magnet and register, is to operate the register with less battery than it would require by itself without the receiving magnet; or it may be stated thus, to increase the power of the register. The combination of the mutator and register is for the same object, so far as I understand the invention.

36. It is.

37. They are not.

38. The spring, in this case, may be considered a mechanical equivalent for one of the magnets, and a piece of soft iron for the other; although they are not so in every respect, as the power of the spring would be greater where the attraction of the permanent magnet is weakest; and as attraction or repulsion is always in operation where there is a permanent magnet, and with a piece of soft iron action continues only as long as it is wanted, while at the same time it cannot

exert a repulsive action, nor itself be repelled, as one magnet repels another.

39. The mutator and receiving magnet accomplish the same result by means somewhat different, though the principle of action may be regarded the same as before stated.

40. In my judgment it is a disadvantage to move the magnet instead of the armature.

41. It is.

42. I cannot see any advantage in the use of the two circuits with the mutator, the use of one circuit is more simple.

43. The second circuit of the mutator is merely a substitute for the spring in the receiving magnet.

44. There is attraction as well as repulsion.

45. With a piece of unmagnetized or soft iron, there would be attraction but no repulsion; that is, the unmagnetic iron must become magnetized before it can be attracted; and after it is magnetized, by induction, it would not, from the disposition of the magnetic forces, exert any action that would be recognised as repulsive.

46. The object of the electro-magnet, in both cases, is the same, viz., to obtain power to mark; and there can be no difficulty in Morse's of obtaining more power than is necessary for this purpose.

47. In my judgment the arrangement in the Columbian operates to a disadvantage. The greater the mass to be moved the greater the force required, or with less force the slower the motion. There is also a disadvantage, arising from the fact that the change of poles in an electro-magnet requires more time than the simple repetition of a charge of magnetism without change of poles.

48. It is no other.

49. The permanent magnet is made magnetic in various ways. By various modes of touching, as it is called, and sometimes by electric action.

50. The electro-magnet is made by electricity.

51. The force or power of the steel or permanent magnet is the same in kind with that of the electro-magnet. The practical distinction between an electro and permanent magnet is, that in the electro-magnet the magnetism is conditional upon the passage of an electric current, and in the permanent magnet it is not; for practical purposes no other distinction can be made.

52. It is considered generally that the attractions and repulsions result from the same power of operating in different directions; they are both exhibitions of the magnetic force.

53. A power that produces motion.

54. A motion would be produced, the *the* direction of which would depend upon the arrangement of the poles of the piece of magnetized soft iron.

55. The attractive force is the most powerful.

56. I should think that the employment of the two forces would necessarily complicate the machine.

57. In Morse's telegraph the magnets operate by their attractive forces, which is all-sufficient for the purpose.

58. If more power were wanted, I should think that the addition of more battery would be the most simple mode of obtaining it.

59. It is obviously so.

60. I think of nothing more that is material in this case.

CHAS. G. PAGE.

Deposition of George Wood.

(Deposition of George Wood, to wit:)

The deposition of George Wood, taken at the mayor's office in the city of Washington, in the District of Columbia, to be read in a suit now depending in the circuit court of the United States for the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

This deponent, being aged fifty-one years, and duly sworn, in answer to the interrogatories filed in said cause and put to him, deposes and says: That I have no answer to the matters inquired of in said interrogatories, numbered from one to fifty-nine, inclusive.

In answer to interrogatory No. 60 he says: The official copy, dated 17th April, 1849, of the Commissioner of Patents, of the original of the specification, and oaths of Samuel F. B. Morse for an electro-magnetic telegraph, dated the 20th June, A. D. 1840, was examined by me on the 23d day of April, 1849, at the Patent office, with the original specification and oaths, in company with E. Goodrich Smith, one of the clerks of said Patent office, and that the copy is in letters and figures as they appear on the original.

And further, that I have long been familiar with the handwriting, figures, and printing of letters made by said Samuel F. B. Morse, with whom I have corresponded for the last five years, and with whom I boarded in the family of the Hon. Henry L. Ellsworth in Washington; and that the words and figures in blue ink in the aforesaid copy are in blue ink in the original, and are as distinctly different from the body of the original specification as are those in the aforesaid copy of the Commissioner of Patents; and that these words and figures in blue ink in the original are of a different handwriting from the said specification, and are believed to be by me, with undoubting conviction, the words and figures of said Samuel F. B. Morse.

That the words written on the margin of the fourth page of the copy in red ink are written on the original of said specification on the margin (in position and place as in the copy) in pencil. The words "not represented" in the handwriting of one not known to me; the other words on said margin, there written in red ink, are written in the handwriting of said Samuel F. B. Morse; and in the body of the original on same page (page 4) as in the copy, there has been an erasure over which has been written these words, "one corner of it bevelled."

And further, that the paragraph on the eleventh page, extending to

the twelfth, appears in the original as in the copy, with no other alterations than those indicated in the blue ink in the handwriting of said Professor Samuel F. B. Morse.

And further, that the copy referred to by me in this deposition has been endorsed by me in these words: "This copy examined by me with the original specification on the files of the Patent office, this 23d day of April, 1849. George Wood."

GEO. WOOD.

Deposition of E. Goodrich Smith, to wit:

Deposition of E. Goodrich Smith.

The deposition of E. Goodrich Smith, taken at the mayor's office in the city of Washington, in the District of Columbia, to be read in a suit now pending in the circuit court of the United States for the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

This deponent, aged forty-seven years and duly sworn, in answer to the interrogatories filed in said cause and put to him, deposes and says: That he has no answer to make to the matters inquired of in said interrogatories numbered from one to fifty-nine inclusive.

In answer to interrogatory No. 60 he says: The official copy dated 17th April, 1849, of the Commissioner of Patents, of the original of the specification and oaths of Samuel F. B. Morse for an electro-magnetic telegraph, dated the 20th June, 1840, was examined by me on the 23d day of April, 1849, at the Patent office, with the original specification and oaths, in company with George Wood and —— Stansbury, one of the clerks of said Patent office, and that the copy is in letters and figures as they appear in the original.

And further, that I have long been familiar with the handwriting, figures, and printing of letters made by said Samuel F. B. Morse, with whom I have corresponded for the last five years, and with whom I boarded in the family of the Hon. Henry L. Ellsworth, in Washington; and that the words and figures in blue ink in the aforesaid copy are in blue ink in the original, and are as distinctly unlike the body of the original specification as are those in the aforesaid copy of the Commissioner of Patents; and that these words and figures in blue ink in the original are of a different handwriting from the said specification, and I believe them to be with undoubting conviction the words and figures of said Samuel F. B. Morse.

That the words and figures written on the margin of the fourth page of the copy in red ink are written in the original of said specification on the margin (in position and place as in the copy) in pencil. The words "not represented" in the handwriting of one not known to me—believed to be the usual mark or correction of one of the examiners of the Patent office; the other words on said margin, there written in red ink, are written in the handwriting of said Samuel F. B. Morse; and in the body of the original on the same page (page 4) as in the copy there has

been an erasure, over which has been written these words, "one corner of it bevelled."

And further, that the paragraph on the eleventh page, extending to the twelfth, appears in the original as in the copy, with no other alterations than those indicated in the blue ink in the handwriting of said Prof. Samuel F. B. Morse; and further, that the copy herein referred to by me has been endorsed by me in these words: "This copy examined by me with the original specification on the files of the Patent office, the 23d day of April, 1849. E. Goodrich Smith."

E. GOODRICH SMITH.

Copy—Patent.

The U. States Patent office, to all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the files of this office of the specification of letters patent and oath of Samuel F. B. Morse for an electro-magnetic telegraph, dated the twentieth day of June, A. D. eighteen hundred and forty, in letters and figures as they appear in the original.

In testimony whereof I, Edmund Burke, commissioner of patents, have caused the seal of the Patent office to be hereunto affixed, the seventeenth day of April, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of the United States the seventy-third.

EDMUND BURKE.

To all persons whom it may concern.

Be it known, that I, the undersigned, Samuel F. B. Morse, of the city, county, and State of New York, have invented a new and useful machine and system of signs for transmitting intelligence between distant points by the means of a new application and effect of electro-magnetism in producing sounds and signs, or either; and also for recording permanently, by the same means and application and effect of electro-magnetism, any signs thus produced, and representing intelligence, transmitted as before named, between distant points. And I denominate said invention the American Electro-magnetic Telegraph, of which the following is a full and exact description, to wit:

It consists of the following parts:

First. Of a circuit of electric or galvanic conductors from any generator of electricity or galvanism, and of electro-magnets, at any one or more points in said circuit.

Second. A system of signs by which numerals, and words represented by numerals, and thereby sentences of words, as well as of numerals and letters, of any extent and combination of each, are communicated to any one or more points in the before described circuit.

Third. A set of type, adapted to regulate the communication of the

above mentioned signs; also cases for the convenient keeping of the type, and rules in which to set and use the type.

Fourth. An apparatus called the straight port rule, and another called the circular port rule, each of which regulates the movement of the type when in use, and also that of the signal lever.

Fifth. A signal lever, which breaks and connects the circuit of conductors.

Sixth. A register, which records permanently the signs communicated at any desired points in the circuit.

Seventh. A dictionary, or vocabulary of words, to which are prefixed numerals for the uses hereinafter described.

Eighth. Modes of laying the circuit of conductors.

The circuit of conductors may be made of any metal, such as copper or iron wire, or strips of copper or iron, or of cord or twine, or other substance, gilt, silvered, or covered with any thin metal leaf, properly insulated, and in the ground, or through or beneath the water, or through the air. By causing an electric or galvanic current to pass through the circuit of conductors, laid as aforesaid, by means of any generator of electricity or galvanism, to one or more electro-magnets placed at any point or points in said circuit, the magnetic power thus concentrated in such magnet or magnets is used for the purposes of producing sounds and visible signs, and for permanently recording the latter at any and each of said points, at the pleasure of the operator, and in the manner hereinafter described, that is to say, by using the system of signs, which is formed of the following parts and variations, viz:

Signs of numerals consist, 1st, of ten dots or punctures, made in measured distances of equal extent from each other, upon paper, or any substitute for paper, and in number corresponding with the numeral desired to be represented; thus one dot or puncture for the numeral 1, two dots or punctures for the numeral 2, three of the same for 3, four for 4, five for 5, six for 6, seven for 7, eight for 8, nine for 9, and ten for 0, as particularly represented in the annexed drawing, marked example 1, mode 1, in which is also included a second character to represent a cypher, if preferred.

Signs of numerals consist, 2dly, of marks made, as in the case of dots, and particularly represented on the annexed drawing, marked example 1, mode 2.

Signs of numerals consist, 3dly, of characters drawn at measured distances in the shape of the teeth of a common saw by the use of a pencil, or any instrument for marking. The points corresponding to the teeth of a saw are in number to correspond with the numeral desired to be represented, as in the case of dots or marks in the other modes described, and as particularly represented in the annexed drawing, marked example 1, mode 3.

Signs of numerals consist, 4th, of dots and lines, separately and conjunctively used as follows, the numerals 1, 2, 3, and 4, being rep-

resented by dots, as in mode 1, first given above: The numeral 5 is represented by a line equal in length to the space between the two dots of any other numeral; 6 is represented by the addition of a dot to the line representing 5; 7 is represented by the addition of two dots to said line; 8 is represented by the prefixing a dot to said line; 9 is represented by two dots prefixed to said line; and cypher is represented by two lines, each of the length of said line that represents the number 5; said signs are particularly set forth in the annexed drawing, marked example 1, mode 4.

Either of said modes are to be used as may be preferred or desired, and in the method hereinafter described.

The sign of a distinct numeral, or of a compound numeral, when used in a sentence of words, or of numerals, consists of a distance or space of separation between the characters of greater extent than the distance used in separating the characters that compose any such distinct or compound numeral. An illustration of this sign is particularly exhibited in the annexed drawing, marked example 2.

Signs of letters consist in variations of the dots, marks, and dots and lines, and spaces of separation of the same formation as compose the signs of numerals, varied and combined differently to represent the letters of the alphabet, in the manner particularly illustrated and represented in the annexed drawing, marked example 3.

The sign of a distinct letter or of distinct words, when used in a sentence, is the same as that used in regard to numerals, and described above.

Signs of words, and even of set phrases or sentences, may be adopted for use and communication in like manner, under various forms, as convenience may suggest.

The type for producing the signs of numerals consist—

1st. Of fourteen pieces or plates of thin metal, such as type metal, brass, iron, or like substances, with teeth or indentations upon one side or edge of ten of said type, corresponding in number to the dots or punctures, or marks, requisite to constitute the numerals, respectively, heretofore described in the system of signs, and having also a space left upon the side or edge of each type, at one end thereof, without teeth or indentations, corresponding in length with the distance or separation desired between each sign of a numeral. Another of said type has two indentations, forming thereby three teeth only, and without any space at either end, to correspond with the size of a cypher, as heretofore described by reference to example 1, modes 1, 2, 3, of drawings in said system of signs; one other of said type is without any indentation on its side or edge, and being in length to correspond with the distance or separation desired between distinct or compound numerals, and with the sign heretofore described for that purpose. One of the remaining two of said type is formed with one corner of it bevelled—System of type, example 4, fig. 1. *[Not represented.—Yes. In "the system of type, example 4, fig. 1st," the pieces marked "rest" and "stop," perhaps "one end of an oval shape," is a phrase not well chosen

* The words within brackets are written in the margin in red ink.

by my lawyer; it would be better to say "with one corner bevelled]—and is called a rest, and the other is in pointed form, and called a stop. Each of said type is particularly delineated on the annexed drawing, marked example 4, figure 1; and numbered or labelled in accordance with the purpose for which they are designed respectively; and are used in like manner for producing of the several signs of numerals heretofore described in the system of signs.

The type for producing the signs of numerals consist, 2ndly, of five pieces or plates of metal, first described above; four of which are the same as are numbered 1, 2, 3 and 4, in the annexed drawing, marked example 4, figure 1; and the fifth one being the same as is denominated in the same example "the long space," and heretofore alluded to; also of six other pieces or plates of the same metal, varied in indentations and teeth and spaces, as represented on the annexed drawing, marked example 4, figure 2, to produce signs of the denominations described in the 4th mode of the before mentioned system of signs, example 1.

The type for producing the signs of letters are of the same denomination with those used in produced signs of numerals, and only varied in form, from one to twenty-three, as exhibited in the annexed drawing, marked example 5.

The type for producing both signs of numerals and signs of letters are adapted for use to either a straight rule, called the straight port rule, and are in that case made straight lengthwise as described in the drawings annexed, and heretofore referred to, in example 5; or to a circular port rule, in which case they are lengthwise, circular, or formed into sections of a circle, as represented in the drawings annexed, marked example 6, figures 2 and 3, and as will be further understood by the descriptions hereinafter contained of the straight and circular port rules. On the under side of the type for the circular port rule, (which type are of greater thickness than those for the straight port rule,) is a groove [system of type, ex. 6 A, in figs. 1 and 3]* about midway, of their width, and in depth about half the thickness aforesaid, and extending from the space ends [as B, example 6, fig. 3]* (that is, the ends without indentations,) of said type along the length, and conforming to the curve thereof, to a point, D D, equal in distance from the opposite ends to half the width of the pointed teeth cut upon their edges. For a delineation of these type, reference is made to sections thereof in figures 1 and 3, upon the annexed drawings, marked example 6.

The type case are wood, or of any other material, with small compartments, of the exact length of the type, for greater convenience in distributing, and resembling those in common use among printers.

The type rules are of wood, or metal, or other material, that may be preferred, and about three feet in length, with a groove, into which the type, when used, are placed. On the under side of each type rule are cogs, by which they are adapted to a pinion wheel, having corresponding cogs, and forming part of a port rule. The type rule in use is moved onward as motion is given to the said wheel. A delineation

* The words within brackets interlined in the original and in blue ink.

of the type rule is contained in the annexed drawing, marked example 7.

The straight port rule consists of a pinion wheel, before mentioned, turned by a hand crank, attached to a horizontal screw, that plays into the cogs of the pinion wheel, as the latter do into the cogs of the type rule, or by any other power in any of the well known methods of mechanism. It is connected with a railway, or groove, in and by which the type rule, from the motion imparted to it by said wheel, is conveyed in a direct line beneath a lever, that breaks and connects the galvanic circuit in the manner hereafter mentioned. A delineation of said wheel, crank, and screw is contained in the drawing hereunto annexed, marked example 8, figures 1, 2, 3.

The circular port rule is a substitute, when preferred, for both the type rule and the straight port rule, and consists of a horizontal or inclined wheel, [example 9, fig. 1 A,]* of any convenient diameter of wood or metal, having its axis connected on the under side of the wheel with a [pinion wheel, K,]* and as in the case of the straight port rule. It is moved by the motion of the pinion wheel, as is the type rule in the former description. On the entire circumference of said horizontal or inclined wheel, and upon its upper surface, is a shoulder or cavity, [a, figs. 1, 2,]* corresponding in depth with the thickness of the type used, and in width, [b,]* equal to that of the type, exclusive of their teeth or indentations. Near the outer edge of the surface of said shoulder or cavity are cogs, [c,]* throughout the circumference of the wheel, projecting upwards at a distance from each other equal to one-half of the width of the teeth or indentations of the type, and otherwise corresponding in size to the width and depth of the groove, [DD, fig. 4,]* in the under side of the circular type before described, and illustrated by reference to example 6, figures 1 and 3. Directly over said shoulder or cavity and cogs, and at one or more points on the circumference of said wheel, is extended from a fixture outside of the orbit of the wheel a stationary type feeder, [E, fig. 1,]* formed of one end, [e,*] one side, [E,]* perpendicular, of tin or brass plate, or other substance, and of interior size and shape to receive any number of the type which are therein deposited, with their indentations projecting outward, [as in fig. 2,]* and their grooves downward, [as in fig. 4.]* Said type feeder is so suspended from its fixture, [F F,]* over the shoulder or cavity of the wheel [A,]* before described, as to admit of the passage under it of said wheel in its circuit as near the bottom of the feeder as practicable without coming in contact therewith. The type deposited in the feeder, as before mentioned, form a perpendicular column, [as in fig. 2,]* the lower type of which rests upon the surface of the before named shoulder of the wheel [6, fig. 2,]* and the cog of the wheel projecting upwards enters the groove [DD, fig. 4,]* of the type herein before described. The operation of said circular port rule in regulating the movement of the type in use is as follows: When the wheel [A]* is set in motion, the type resting immediately upon the shoulder of the wheel in the manner mentioned above, [as in fig. 2,]* is carried forward on the

* Interlined, in blue ink.

curvature of the wheel from beneath the column of type resting upon it in the stationary type feeder, by means of [one of]* the before named cogs coming in contact with that point, [D, fig. 3, example 6,]* in the groove of the type hereinbefore described as forming the termination of said groove, and which is particularly delineated [at the points DD]* in the annexed drawing, marked example 6, figure 3. As by said process the lower type in the column, that is held by the stationary feeder, is carried forward and removed, the next type settles immediately upon the shoulder of the wheel, and after the manner of the removed type is brought in contact with another cog of said shoulder within the groove of the type, and thence carried forward from beneath the incumbent column, as was its predecessor. Then follows consecutively, in the same method, each type deposited within the feeder so long as the wheel is kept in motion. The deposit of the type in the stationary feeder is regulated by the order in which the letters or numerals, or words they represent, are designed to be communicated at any distant point or points. After the type are respectively carried forward on the curvature of the wheel, in the manner stated above, beyond the point where they are acted upon by the signal lever, as is hereinafter described, they are lifted, each in its turn, from the shoulder of the wheel [A,]* and cast off into a box or pocket, [G,]* below the wheel, by means of a slender shaft or spindle, [H,]* made of any metal, and resembling in form a common plough-share, extending downward from a fixture, [O,]* placed outside of the wheel, into a groove, [K,]* within the before named shoulder of said wheel [A,]* and on the inner side of the cogs [C,]* already described. By means of said groove the downward point of said shaft or spindle [H]* is brought within the curvature and below the surface of said shoulder b, fig. 2,* and, consequently, under the approaching end of the type, so that each type, successively, as it is carried forward on said curvature, in the manner before described, is lifted from the shoulder and forced upwards on the inclined shaft or spindle by the type in contact with it at the other end, until turned off into the before named box or pocket G* below, ready for a redistribution. For a more particular delineation of the several parts of said circular port rule reference is made to the annexed drawing, marked example 9, figures 1 and 2.

The signal lever, [example 9, fig. 3,*] consists, first, for use with the straight port rule, [ex. 8, fig. 1, A,] of a strip of wood of any length, from six to twenty-four inches, resting upon a pivot, [a,]* or in a notched pillow formed into a fulcrum by a metal pin, [a,]* passing through it and the lever. At one end of the lever a metallic wire, bent to a semi-circular or half square form, [as at A,]* or resembling the prongs of a fork distended, is attached by its centre, as described in the annexed drawing, example 8, at the point marked A. Between said end of the lever and the fulcrum a,* near the latter, on the under side of the lever [A,]* is inserted a metallic tooth or cog, [b,]* curved on the side nearest to the fulcrum, and in other respects corresponding to the teeth or indentations upon the type already described. On the opposite

* Interlined, and in blue ink, where inclosed in brackets.

extremity of the lever is a small weight, [C,]* to balance or offset, in part, when needed, the weight of the lever on the opposite side of the fulcrum. The lever thus formed is stationed directly over the railway or groove [DD,]* heretofore described as forming a connected part of the straight port rule. The movement of the type rule brings the tooth of each type therein set in contact with the tooth or cog of the lever, and thereby forces the lever upward until the points of the two teeth in contact have passed each other, when the lever again descends as the teeth of the type proceed onward from the tooth of the lever. This operation is repeated as frequently as the teeth of the type are brought in contact with the tooth of the lever. By thus forcing the said lever upward and downward, the end of the semi-circular or pronged wire are made alternately to rise from and fall into two small cups or vessels of mercury, [E E,]* in each of which is an end or termination of the metallic circuit conductors first described above. This termination of the metallic circuit in the two cups or vessels breaks and limits the current of electricity or galvanism through the circuit; but a connexion of the circuit is effected or restored by the falling of the two ends of the pronged wire, A, attached to said lever, into the two cups, connecting the one cup with the other in that way. By the rising of the lever, and consequently the wire upon its end from its connexion with said cups, said circuit is in like manner again broken, and the current of electricity or galvanism destroyed. To effect, at pleasure, these two purposes of breaking and connecting said circuit, is the design of said motion that is imparted in the before mentioned manner to said lever; and to regulate this motion and reduce it to the system of intelligible signs before described, is the design and use of the variations in the form of the type, also before described. A plate of copper, silver, or other conductor, connected with the broken parts of said circuit of conductors, and receiving the contact of the wire attached to said lever, may be substituted if preferred for said cups of mercury. For a particular delineation of the several parts of said lever, reference is made to the annexed drawing, marked example 8.

The signal lever consists, 2ndly. For use with the circular port rule, [exam. 9, fig. 3,]* of a strip of wood, [G,]* with a metallic wire, [A,]* at one end of the form and for the purposes of the lever already described above. It turns on a pivot or fulcrum, [a,]* placed either near the middle or in the end of the lever. At the end of the lever [at C,]* opposite to the metallic wire, [A,]* an elbow, [C,*] is formed on a right angle with the main lever, and extending downward from the level with the pivot or fulcrum sufficiently for a metallic tooth, [H,]* in the end thereof, corresponding with the teeth or indentations of the type already described to press against the type projecting from the shoulder or cavity of the wheel, [A, fig. 1,]* that forms the circular port rule before described. Said wheel is placed beneath said lever [as seen at G, fig. 1,]* in a position to be reached by the extremity [or tooth, H,]* of the arms of the lever just mentioned. The tooth, H, in the arm of the lever is kept in constant contact with the type of the circular port rule by the pressure of a spring,

*Interlined, and in blue ink.

B, upon it, as described in the annexed drawing, marked example 9; at B, fig. 1 and 3, in the same example exhibit sections of the said lever. The action thus produced by the contact of the teeth of the type in the port rule, when said wheel is in motion with the tooth in the arm of the lever, lifts up and drops down the opposite extremity, [A,]* of said lever, having the metallic wire upon it, as the tooth of said lever passes into or out of the indentations of the type, and in the same manner and to the same effect as the first described lever rises and falls, and accordingly breaks and closes the circuit of conductors as in the former instance. In the use of this circular port rule and its appropriate lever, fig. 3, type may be used, having the points of their teeth and their indentations shaped as counterparts or reverses to those delineated in the annexed drawing, heretofore referred to, and marked example 4, 5, and 6, and thereby the forms of the recorded signs will be changed in a corresponding manner.

The register consists, 1st, of a lever of the shape of the lever connected with the circular port rule above described, and is delineated in the annexed drawing, marked example 10, figures 1, 2, and 4, at A. Said lever, [A,]* operates upon a fulcrum, [a,]* that passes through the end that forms the elbow, [a,]* upon the lower extremity of which, and facing an electro-magnet, is attached the armature of a magnet, [f.]* In the other extreme of the lever, [at B,]* is inserted one or more pencils, fountain pens, printing wheels, or other marking instruments, as may be seen in the figure 4, of example last mentioned, at letter B. The magnet is at letter C, in the same figure.

2ndly. Of a cylinder or barrel of metal or wood, and covered with cloth or yielding coating, to turn upon an axis and occupying a position directly beneath the pencil, fountain pen, printing wheel, or other marking instrument to be used, as exhibited in the last mentioned example of drawings, figure 4, D. Two rollers, marked b b, in said figure of drawings, are connected with said cylinder on the upper side curvatures thereof, and being connected with each other by two narrow bands of tape passing over and beneath each, near the ends thereof, and over the intervening surface of the cylinder in a manner to cause a friction of the bands of tape upon the latter, when in motion, as delineated in the last named example, figure 4, at points marked c, c, c. The distance between said bands of tape on the rollers is such as to admit of the pencil, or other marking instrument in the lever, to drop upon the intervening space of the cylinder. Near by said cylinder is a spool to turn on an axis and marked d, in the said figure, to receive any desired length of paper or other substance formed into strips, or a continuous ribbon, and for the purpose of receiving a record of the signs of intelligence communicated. When the register is in motion, one end of the paper on said spool being inserted between the under surfaces of said two rollers, under the strips of tape that connect them and the cylinder, it is drawn by the friction or pressure thus caused upon it forward from said spool gradually, and passed over said cylinder, and is thence depos-

* Interlined, and in blue ink.

ited in a box on the opposite side, or is cut off at any desired length as it passes from the cylinder and rollers.

3dly. Of an alarm bell, [A, ex. 10, fig. 5,]* which is struck by means of a lever hammer [B,]* that is acted upon by a moveable cog [b,]* placed upon an axis or pin b, that confines it in the lower extremity of a pendulum lever marked E, in fig. 5, of example 10, having an armature of a magnet attached to it at [a,]* and acted upon by an electro-magnet, [o,]* placed near it and the before named magnet, and in the same circuit of conductors with the latter. Said cog b moves in a quarter circle only, as the motion of said arm of the lever passes backward and forward in the act of recording as hereinafter described. When forced into a horizontal position in said quarter circle, it ceases to act upon the hammer; but when moved from a perpendicular position, it presses upon the projection in the end of the hammer, causing the opposite end of the hammer to be raised, from which elevation it again falls upon a stationary bell, [A,]* as soon as said cog reaches a horizontal position and ceases, as before mentioned, to press upon the hammer. Thus a notice by sound or an alarm is given at the point to which intelligence is to be communicated as soon as the register begins to act; and such sound may be continued or not, at pleasure, for the purpose mentioned, or for any other uses, as the hammer shall be suspended or not from contact with the bell, or with any number of bells that may be employed. Figure 5 of said example, marked 10, in the annexed drawing, represents sections of said hammer and bell.

Said several parts of the register are set in motion by the communication to or action upon the before named armature of a magnet attached to the lever of the register of the electric or galvanic current in the circuit of conductors, and from an electro-magnet in said circuit, as before described, stationed near the said armature. As said armature is drawn or attracted from its stationary and horizontal position towards the said magnet, when the latter is charged from the circuit of conductors, said lever is turned upon its fulcrum, and the opposite end thereof necessarily descends and brings the pen, or marking instrument which it contains, in contact with the paper or other substance on the revolving cylinder directly beneath it. As said armature ceases to be thus drawn or attracted by said magnet, as is the case as soon as said magnet ceases to be charged from the circuit of conductors, or as the current in said circuit is broken in the manner hereinfore described, the said armature is forced back by its own specific gravity, or by a spring or weight as may be needed, to its former position, and the pen or marking instrument in the opposite end of the lever is again raised from its contact with the paper or other substance on the before named revolving cylinder. This same action is communicated simultaneously from the same circuit of conductors to as many registers as there are corresponding magnets provided within any circuit, and at any desired distances from each other. The cylinder and its two associate rollers are set in motion simultaneously with the first motion of the lever by the withdrawal of a small wire or spindle, [g, ex. 10, figs. 2 and 5,]* from beneath one

* Interlined, and in blue ink.

branch of a fly wheel, K, that forms a part of the clock machinery hereafter named. Said wire, [g,]* is withdrawn by the action upon said wire of a small electro-magnet, [O, figs. 2 and 5,]* stationed in the circuit and near the large magnet* before named, as delineated in figure 5 of example 10. Said cylinder and rollers are subsequently kept in motion by a train of wheels similar to common clock wheels, [as in figs. 2 and 3,]* acted upon by a weight raised as occasion may require by a hand crank, and their motion is regulated by the same wheels to correspond with the action of the registering pen or marking instrument. Said train is represented in figures 1, 2, and 3 of said example 10.

The electro-magnet thus used is made in any of the usual modes, such as winding insulated copper wire, or strips of copper, or tin foil, or other metal, around a bar of soft iron, either straight or bent into a circular form, and having the two extremities of the coils connected with the circuit of conductors so that the coils around the magnet make part of the circuit.

To extend more effectually the length of any desired circuit of conductors, and to perpetuate the power of the electric or galvanic current equally throughout the same, I adopt the following mode, and also for connecting and using any desired number of additional and intervening batteries or generators of said current, and for connecting progressively any number of consecutive circuits, viz: Place at any point in a circuit an electro-magnet of the denomination already described, with an armature upon a lever of the form and structure, and in the position, of that used at the register to hold and operate the marking instrument, with only a substitution therein for such marking instrument of a forked wire, [A, exam. 9, fig. 3,]* like that upon the end of the signal lever heretofore described. Directly beneath the latter wire place two cups of mercury, [E E,]* or two metallic plates joined to terminations of a circuit leading from the fresh or additional battery or generator of said circuit in the same manner as they are to be provided in the first circuit of conductors at the points where the cups of mercury are herein before described. As the current in the first circuit acts upon the magnet thus provided, the armature thereof and lever are thereby moved to dip the forked wire [A]* into the cups of the second circuit as in the circuit first described. This operation instantly connects the break in said second circuit, and thus produces an additional and original power or current of electricity or galvanism from the battery of said second circuit to the magnet or magnets placed at any one or more points in such circuit, to be broken at pleasure, as in the first circuit; and from thence, by the same operation, the same results may again be repeated, extending and breaking at pleasure such current through yet another and another circuit, ad infinitum, and with as many intervening registers for simultaneous action as may be desired, and at any distances from each other.

The dictionary or vocabulary consists of words alphabetically arranged and regularly numbered, beginning with the letters of the al-

* Interlined, and in blue ink.

phabet, so that each word in the language has its telegraphic number, and is designated at pleasure through the signs of numerals.

The modes which I propose of insulating the wires or other metal for conductors and of laying the circuits are various.

The wires may be insulated by winding each wire with silk, cotton, flax, or hemp, and then dipping them into a solution of caoutchouc, or into a solution of shellac, or into pitch or resin and caoutchouc. They may be laid through the air, enclosed above the ground, or in the ground, or in the water. When through the air, they may be insulated by a covering that shall protect them from the weather, such as cotton, flax, or hemp, and dipped into any solution which is a non-conductor, and elevated upon pillars. When enclosed above the ground, they may be laid in tubes of iron or lead, and these again may be enclosed in wood if desirable. When laid in the ground, they may be enclosed in iron, leaden, wooden, or earthen tubes, and buried beneath the surface. Across rivers, the circuit may be carried beneath the bridges, or where there are no bridges enclosed in lead or iron, and sunk at the bottom or stretched across, where the banks are high, upon pillars elevated on each side of the river.

What I claim as my invention, and desire to secure by letters patent, is as follows:

1st. The formation and arrangement of the several parts of mechanism constituting the type rule, the straight port rule, the circular port rule, the two signal levers and the register lever, and alarm lever with its hammer, as combining respectively with each of said levers one or more armatures of an electro-magnet, and as said parts are severally described in the foregoing specification.

2dly. The combination of the mechanism constituting the recording cylinder, and the accompanying rollers and train wheels, with the formation and arrangement of the several parts of mechanism, the formation and arrangement of which are claimed as above, and as described in the foregoing specification.

3dly. The use, system, formation, and arrangement of type and of signs for transmitting intelligence between distant points by the application of electro-magnetism and metallic conductors, combined with mechanism, described in the foregoing specification.

4th. The mode and process of breaking and connecting by mechanism currents of electricity or galvanism in any circuit of metallic conductors, as described in the foregoing specification.

5th. The mode and process of propelling and connecting currents of electricity or galvanism in and through any desired number of circuits of metallic conductors, from any known generator of electricity or galvanism, as described in the foregoing specification.

6th. The application of electro magnets by means of one or more circuits of metallic conductors, from any known generator of electricity or galvanism, to the several levers in the machinery, described in the foregoing specification, for the purpose of imparting motion to said levers and operating said machinery, and for transmitting by signs and

sounds intelligence between distant points, and simultaneously to different points.

7th. The mode and process of recording or marking permanently signs of intelligence transmitted between distant points, and simultaneously to different points, by the application and use of electro-magnetism or galvanism, as described in the foregoing specification.

8th. The combination and arrangement of electro-magnets in one or more circuits of metallic conductors, with armatures of magnets for transmitting intelligence, by signs and sounds, or either, between distant points, and to different points simultaneously.

9th. The combination and mutual adaptation of the several parts of the mechanism, and system of type and of signs, with and to the dictionary or vocabulary of words, as described in the foregoing specification.

In testimony whereof I, the said Samuel F. B. Morse, hereto subscribe my name in the presence of the witnesses whose names are hereto subscribed, on the 7th day of April, A. D. 1838.

SAML. F. B. MORSE.

Witnesses—
B. B. FRENCH,
CHARLES MONROE.

UNITED STATES OF AMERICA,
District of Columbia,
County of Washington, ss.

On this, [date omitted] day of —1838, before the subscriber, a justice of the peace in and for the said county, personally appeared the within named Samuel F. B. Morse, and made solemn oath that he believes himself to be the first and original inventor of the several parts and application thereof of the American Electro-magnetic Telegraph above mentioned, and described in the specification of claim thereto by him subscribed; and that he does not know or believe that the same was ever before known or used, and that he is a citizen of the United States.

C. H. WILTBERGER,
Justice of the Peace.

COUNTY OF NEW YORK, *ss.*

On this 29th day of May, 1840, before the subscriber, the mayor of the city of New York, personally appeared the within named Samuel F. B. Morse, and made solemn oath, that he believes himself to be the first and original inventor of the several parts and applications thereof of the American Electro-magnetic Telegraph above mentioned, and described in the specification of claim thereto by him subscribed, and that he does not know or believe that the same was ever before known or used, and that he is a citizen of the United States.

ISAAC L. VANAN, *Mayor.*

Ex'd.—J. COLEMAN.

This copy examined by me with the original specification and oaths on the files of the Patent office, on the 23d day of April, 1849, referred to in my deposition taken 9th May, 1849.

GEO. WOOD.

This copy examined by me with the original specification and oaths on the files of [the] Patent office, on the 23d day of April, 1849.

E. GOODRICH SMITH,
Librarian of the Patent office.

Deposition of L. H. Schneider.

(Deposition of Lewis H. Schneider, to wit:)

The deposition of Lewis H. Schneider, taken at the mayor's office in the city of Washington, in the District of Columbia, to be read in a suit depending in the circuit court of the United States, for the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

The deponent being thirty-two years of age, and duly sworn, in answer to the interrogatories put to him, deposes and says:

To question 1. My age is thirty-two; my profession a mechanician, and my residence the city of Washington.

To question numbered 2 to 9 inclusive, and from 14 to 23, and from 25 to 60 inclusive, he has no knowledge, and makes no answers.

But to questions No. 10 to 13, inclusive, he deposes and says, that he has read the letters patent, together with the specifications, and compared this same with the drawings thereto annexed, as severally referred to in said questions No. 10, 11, 12, and 13, and that he could readily construct and use the several machines as therein patented and described, from the specifications and drawings attached to the several latters patent.

In reply to question 24 the deponent replied, I have been employed in the making and constructing of the instruments used in Morse's patented telegraph.

LEWIS H. SCHNEIDER.

I, William W. Seaton, mayor of the city of Washington, in the District of Columbia, certify that on the ninth day of May, in the year of our Lord one thousand eight hundred and forty-nine, by virtue of a commission issuing from the circuit court of the United States, for the district of Kentucky, hereto annexed, I called and caused to come before me, at my office in the city aforesaid, Edmund Burke, Leonard D. Gale, Charles G. Page, George Wood, E. Goodrich Smith, and Lewis H. Schneider, all of said city, witnesses for the complainants in a suit depending in said court, in which Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants. And the said Edmund Burke, Leonard D. Gale, Charles G. Page, George Wood, E. Goodrich Smith, and Lewis H. Schneider, being severally

by me first duly sworn, and diligently examined on oath touching the premises, upon the interrogatories annexed to the aforesaid commission, did each write down in my presence the several answers subscribed in his name; and that they, the said Edmund Burke, Leonard D. Gale, Charles G. Page, George Wood, E. Goodrich Smith, and Lewis H. Schneider, did respectively subscribe their names in my presence, each to his respective deposition.

In testimony whereof I have hereunto subscribed my name, and caused the seal of said city to be affixed the day and year above written. [L. S.]

W. W. SEATON, *Mayor.*

Attest: WM. J. McCORMICK, *Register.*

Deposition of Benj. Pike, Jr.

(Deposition of Benjamin Pike, Jr., to wit:)

The deposition of Benjamin Pike, jr., taken before Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of the said city, at the office of the said mayor, at the City Hall, in the said city, on the tenth day of May, eighteen hundred and forty-nine, in the city and county of New York, to be read in evidence in a certain suit depending in the circuit court of the United States, for the eighth circuit of the Kentucky district, holden in Frankfort, wherein Saml. F. B. Morse, A. Vail, and Francis O. J. Smith are complainants, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings are defendants.

The said defendant having been first carefully examined, and cautioned, and sworn on the holy evangelists of Almighty God to tell the whole truth, doth depose and say: That he lives a greater distance from the said town of Frankfort than one hundred miles; furthermore, he saith that he is by profession an optician, and manufacturer of philosophical apparatus, and resides in the city of New York; and that he has carefully examined the drawings and descriptions affixed to this deposition, marked plate 1 and plate 2; and that he perfectly understands the operation of the respective instruments delineated therein, to wit, in plate 1, that which is styled "Barnes and Zook's instruments, called the Columbian;" and in plate 2, that which is styled "Morse's instruments;" and this deponent declares, that in his opinion, the instruments of both plates are in principle the same. The motive power in both is the same, to wit, electro-magnetism. In both there is a main battery and main circuit, having in the latter a helix for the purpose of magnetizing at pleasure a piece of soft iron within it, and by means of which the broken points of a secondary or local circuit is closed or opened, which secondary or local circuit magnetizes a bar of soft iron within a helix, for the purpose of striking a pen point against paper moved by clock work before said point into a groove, by which a dot or a line at pleasure is indented or embossed on the paper. So that the

power in both instruments is the same, the means are the same, and the result is the same.

This deponent further saith, that therefore he deems the instrument of Barnes and Zook, called the Columbian, as delineated in the annexed plate, I, a palpable and direct infringement of Morse's, as delineated in plate 2.

The differences in the Columbian this deponent considers but clumsy and inconvenient mechanical equivalents of Morse's to accomplish by more complicated means or arrangements the same result which is attained by the simplest means by Morse. For example—in the mutator of Barnes and Zook, the electro-magnet is made to move with mechanical disadvantage towards the armature, while in Morse's receiving magnet the armature is made to move towards the electro-magnet with great mechanical advantage, (the less weight towards the greater,) while the act to be performed is precisely the same in each, to wit, the closing and breaking of a secondary or local circuit; again, in the process of Barnes and Zook, two secondary circuits and two batteries are employed to produce the same effect which *Prof.* Professor Morse produces by one secondary circuit and one battery, and a simple spring.

Again: the registering, or marking process of Barnes and Zook is complicated by the introduction of two permanent steel magnets, which are useless appendages, since Prof. Morse accomplishes the same result by a small armature of soft iron, which is the mechanical equivalent for one of these permanent steel magnets, and a spring which is the mechanical equivalent for the other.

BENJ. PIKE, JR.

Sworn before me this 10th day of May, 1849.

CALEB S. WOODHULL, *Mayor.*

I, Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of the said city, acting as such, do certify, that at the request of the said Saml. F. B. Morse, complainant, I caused the above named Benjamin Pike, jr., deponent in the foregoing deposition, to come before me at the time and place in the caption stated, because the said witness resides a greater distance than one hundred miles from Frankfort, Kentucky, the place of holding the said court of the United States, as is stated. I did not cause any notice to be given to the adverse party of the time of taking this deposition, because the said adverse party does not, as I know or believe, reside within one hundred miles of the place of taking the same, nor has said party any agent or attorney known to me within that distance; and that the said witness was by me carefully examined, cautioned, and sworn, then and there to testify the whole truth, and that the said deposition was wholly reduced to writing by and that he then and there in my presence subscribed the same; that I am not counsel or attorney for either of the parties, or interested in the

event of the cause. All which is certified to said court as the cause wherefor this deposition is taken, and for the manner it is done.

In testimony whereof I have hereunto set my hand, and affixed the [L. S.] seal of the mayoralty of the city of New York, on this tenth day of May, A. D. 1849.

C. S. WOODHULL, *Mayor.*

Plate 1.

The drawing of the instrument or telegraph of Barnes and Zook, called the Columbian, as shewn to the undersigned.

Plate 1—fig. 1.

A is the main battery.

B is the conductor from one pole of the main battery to C, the anvil of the key having the points between the anvil C, and the hammer, D, broken. From the back of the key the conductor B, of the main circuit, is continued to the helix

E and back, to the other pole of the main battery.

F is a bar of soft iron passing through the helix, and affixed at one end to a bent bar, while the other end is opposite to a permanent steel magnet, Z, the soft iron bar is so suspended at the points

GG of the bent bar as easily to move to and fro within the helix

H is a spring whose tendency is to move F in the direction of the arrow. The bent metallic bar has two projecting points, J and L, opposite respectively to

K and M, the points of two adjusting screws, which are the separated points of two secondary circuits, uniting the poles of the two local or resident batteries

O & Q. From the negative pole of local battery O, and the positive pole of local battery Q, a conductor goes to the helix, R, of an electro magnet, S, which is the register magnet, and to which is affixed a bent bar or arm, X, having at its extremity a pen point, Y; which bar and electro-magnet and helix are suspended on a point, as at A, fig. 2, or rest on wheels or rails, so as to move easily between the poles of two permanent steel magnets, T U & V W, T being the north pole and U the south of one, and W the north and V the south of the other; and thence the conductor goes to the pivot of the bent bar of the mutator at e.

Operation of the instrument.

Where the key is pressed down so as to close D & C, (the upper part of the circuit B,) the electricity of the main battery A pervades the entire circuit, making F an electro-magnet; the permanent steel magnet Z being the keeper or armature of said electro-magnet, and being fixed while the electro-magnet is moveable; the mutual attraction causes the electro-magnet to move towards the armature Z. This closes the local circuit at M & L of the local battery O, the electricity of which now pervades the circuit of said battery in the direction of the

arrows 2 2 2, &c., through the helix R of the register magnet S, so that the pole opposite V of the permanent magnet shall be south, while the other pole of the register magnet will be north. By this operation the register magnet is, through its attraction, and being moveable, drawn to the permanent magnet or armature T U; and the pen point Y is made to strike the paper into the groove of the moveable or fixed roller C, indenting the paper with a dot or a line according to the time the key of the main circuit is closed or pressed down. When the key is raised, breaking the main circuit at D & C, the helix E loses its electricity, the magnet F loses its magnetism, and the spring H now operates to draw back F, and thus breaking the circuit of local battery O at M L, closes the circuit of local battery Q at J K; the electricity of battery Q now pervades the circuit in the direction of the arrows 1 1 1, &c., the poles of the register electro-magnet S are reversed, so that the mutual attraction between V & W and the electro-magnet causes the pen point to recede from the paper.

Plate 2.

Is the drawing shown me of the instrument or telegraph of Professor Morse.

A is the main battery.

B is the conductor from one pole of the main battery to C, the anvil of the key having the points between the anvil C and the hammer

D broken from the back of the key; the conductor B is continued to the helix E, and back to the other pole of the main battery.

F is a bar of soft iron affixed to a metallic bar so suspended at the points

G G, as easily to move to and fro.

H is a spring whose tendency is to move F in the direction of the arrow. The metallic bar has two projecting points, J & L, opposite respectively to K & M, the points of the two adjusting screws. The two points, L & M of which are the separated points of a secondary circuit uniting the poles of the local battery O O. From one pole of the local battery, as at P, a conductor goes in the direction of the arrows to R, the helix of an electro-magnet,

S, above which, upon a bar or lever, is an armature of soft iron, T, having its fulcrum at U. At the extremity of the bar or lever is a pen point Y; a & b are two cylinders connected with clock work to draw the paper, one of which (a) is also grooved opposite the pen point Y. X is a spring whose tendency is to keep the pen point Y from the paper, and the armature T from the magnet S.

Operation of the instrument.

When the key is pressed down so as to close D & C, (the open part of the circuit B) the electricity of the main battery A pervades the entire circuit, making the interior soft iron an electro-magnet; and F, the keeper or armature being moveable, the mutual attraction causes the

keeper to move towards the magnet. This closes the local circuit at M L of the local battery O O, the electricity of which now pervades the circuit of said battery in the direction of the arrows through the helix R of the register magnet S, so that the keeper T upon the moveable bar or lever is drawn to the magnet, and the pen point Y is made to strike the paper into the groove of the moveable or fixed roller a, indenting the paper with a dot or a line, according to the time the key of the main circuit is closed. When the key is raised, breaking the main circuit at D & C, the helix E loses its electricy, the magnet loses its magnetism, and the spring H now operates to draw back F, and thus breaking the circuit of the local battery O O; at M L the local circuit loses its electricity, the register magnet its attractive power, and the spring X causes the pen to recede from the paper.

I certify that this sheet was made an exhibit before me on the taking of deposition of Benjamin Pike, and he signed his name thereto, and the date of the deposition hereunto annexed.

Witness my hand and seal this 10th day of May, A. D. 1847.

C. S. WOODHULL, [L. S.]
Mayor.

Interrogatories.

Interrogatories to be propounded to witnesses on the part of the complainants:

1. What is your age, profession, and residence?
2. Are you acquainted with the invention, called Morse's Electro-magnetic Telegraph? If yea, state when, where, and under what circumstances you became acquainted with it.
3. How did Prof. S. F. B. Morse propose to communicate intelligence at a distance? Was it by an evanescent sign, or by imprinting the sign at a distance?
4. Did or not Prof. Morse describe to you any apparatus or parts of apparatus of a telegraph? If yea, when and where did he do so?
5. Did or not he ever show to you any apparatus or machine in operation? And if yea, when and where did he do so?
6. Please exhibit and annex to your deposition a drawing or drawings delineating the said apparatus or machine so shown to you, and describe the operation of the said machine.
7. Did or not Prof. Morse, to your knowledge, ever have or propose any other mode of making signs at a distance? And if yea, what was that method, and when did he propose it?
8. Did he employ, or propose to employ, a single circuit or conductor, or more than one?
9. State whatever else you may know respecting the invention, by Prof. S. F. B. Morse, of the electro-magnetic telegraph; the dates and all the particulars in relation to its inception, progress, and completion.
10. Have you read the letters patent of the United States issued to

S. F. B. Morse on the 13th June, 1848, for a new and useful improvement in the mode of communicating information by signals by the application of electro-magnetism, being a second re-issue of the patent issued to said Morse originally, on the 20th day of June, 1840, together with the specifications thereto annexed? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibits a description of the invention in such full, clear, and exact terms as would enable you to construct and use the same.

11. State whether or not, in your opinion, any person skilled [in] the art or science to which said invention appertains, or with which it is most nearly connected, would be enabled, from the specification and drawings annexed to the said letters patent, to construct and use said invention.

12. Have you read the letters patent, issued to S. F. B. Morse on the 13th June, 1848, for an improvement in electro-magnetic telegraph, being a reissue of a patent issued to said Morse on the 11th April, 1846, with the specifications annexed thereto? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the said patented improvement in such full and clear terms as would enable you to construct and use the same.

13. State whether or not, in your opinion, any person skilled in the art or science to which said patented improvement is most nearly connected, would be enabled, from said last named specifications and drawings, to construct and use the said improvements.

14. State whether or not, in your opinion, the said last named specification does clearly and sufficiently show in what said improvement consists, and distinguish what is new from what is old.

15. State what you may know respecting the erection of a line of telegraph, by the deft., H. O'Rielly, and those employed by him, from Louisville, Kenty., to Nashville, Tenn.; when the same was built, what is the nature of said line, and what it was commonly called.

16. State, in like manner, what you may know respecting the building of a line of telegraph between the same points by or for the compl'ts, when it was done, and the nature of the same, when it was put in operation, and whether it has continued to operate.

17. State what you may know respecting the mode in which the def'ts put and kept their line in operation, and all the circumstances attending the same.

18. State the situation of the terminus and office of the deft's said line in Louisville; and whether and when you visited the same.

19. Describe the apparatus and machinery you observed in the said office, and annex a drawing or drawings of the same; and explain, as fully as you can, the mode of its operation.

20. What was the said apparatus called, and whose invention was it said to be?

21. Have you at any time, and when, visited the office at the Nashville end of the line of the defts.? And if yea, describe the apparatus

and machinery used in the said office for telegraphing as fully and clearly as you can, together with its mode of operation.

22. Were you present at the hearing before his honor, the district judge of Kentucky, in August and September, 1848, of the motion for an injunction in this case? If yea, state whether any instrument for telegraphing was exhibited on the part of the deft's; and if yea, what was it called, and in what, if in any, respect did it differ from the instrument in the office of the deft's at Louisville?

22. Are you acquainted with the instrument, called Barnes and Zook's telegraph, said to be invented by Barnes & Zook, and its mode of operation? If yea, state the extent of your knowledge upon this subject, and when, where, and how you acquired the same.

24. Are you acquainted with the inventions patented to S. F. B. Morse by the U. States? Have you read his patent, issued on the 13th June, 1848; and have you seen his said inventions in operation?

25. Describe the telegraph of Morse and that of Barnes & Zook, embracing the whole of each machine, with all its parts, from the main battery to the register, describing the functions of each part, and annex to your answers such drawings of both the instruments as may be useful to explain them, and facilitate the understanding of your answers.

26. Examine the drawings now exhibited to you, marked "drawings of Barnes and Zook's telegraph" with the explanatory notes, and having written your name and the date of taking this deposition thereon, please to state upon such examination, or upon your knowledge of the instrument itself, from having seen the same, (naming which) whether or not in your opinion the essential principles of the instrument of Barnes and Zook are the same as those of Morse's instrument.

27. Do the two instruments produce the same or different results upon the same or different principles?

28. If the instrument of Barnes and Zook differs in your opinion from that of Morse, what is the nature of these differences, and do they affect the essential principles of the two?

29. State whether in your opinion the essential principles of Morse's instrument as patented, is or is not involved in that of Barnes and Zook.

30. If in your opinion the instrument of Barnes and Zook differs from that of Morse as patented, do those differences in your opinion constitute any improvement?

31. State in what the two registering instruments appear to differ.

32. State in what do they appear to resemble each other.

33. State in what the two instruments called the mutator and the receiving magnet appear to differ, and in what they resemble each other.

34. What is the object to be attained by the separate pieces of apparatus in each instrument, the register, the mutator, and the receiving magnet?

35. What is the object to be attained by the combination of the two parts of the apparatus in each, to wit, by the combination of the regis-

ter and the receiving magnet in the one case, and the register and mutator in the other?

36. Is the power of electro-magnetism in the two instruments essential to put either of them in operation?

37. Are the permanent magnets in the Columbian essential to the ultimate end to be attained by both instruments, to wit, the marking of characters at a distance?

38. Would a spring be a mechanical equivalent for one of the permanent magnets, and a piece of soft iron an equivalent for the other?

39. Does the mutator and the receiving magnet accomplish the same result by substantially the same means?

40. Is there an advantage or a disadvantage in having the magnet move instead of the armature, in the mutator and register of the Columbian?

41. Is it or not a well established law of mechanics, that a less weight is moved with less force than a greater?

42. The mutator breaks and closes two local or "resident" circuits, while the receiving magnet breaks and closes but one. Is the same end which is attained by each better secured by multiplying the circuits, or is the second a needless addition?

43. By Morse's receiving magnet when a single local circuit is closed an electro-magnet is produced in that circuit which directly marks by attracting an armature placed near the poles of the magnet. When the circuit is broken and the magnetic attraction ceases, a spring returns the armature to its normal position. Is the second circuit of the mutator of any other use than to be an equivalent of the spring in the receiving magnet?

44. In the action of the electro-magnet with the permanent magnets in the Columbian, is there not attraction as well as repulsion?

45. Would or not a piece of unmagnetic iron placed in the position of one of the permanent magnets, and a spring substituted for the other permanent magnet, produce the same effects of attraction and repulsion, though it may be in less degree?

46. Is or not the object of both arrangements of electro-magnets in the two instruments the same, to wit, to obtain power to mark, and in Morse's arrangements is there any difficulty in obtaining more power than is necessary to accomplish that object?

47. Is there any advantage in this respect in the Columbian arrangement over the arrangement in Morse's; is there any disadvantage?

48. Is the contrivance of the permanent magnet any thing else than a less convenient mode of applying the electro-magnetic power?

49. How is the permanent magnet, often called the steel magnet made magnetic?

50. How is the electro-magnet made magnetic?

51. Is or not the magnetic power or force of the steel magnet and of the electro-magnet essentially the same? If not, at what point, having regard to the density of the metal magnetized, does electro-magnetism cease and permanent magnetism commence?

52. Is it settled among scientific men whether the attraction and repulsion of magnets are different forces or powers of the same force operating in different directions; are or are not both magnetic powers, and one as much so as the other?

53. What is meant among scientific men by the terms "a motive power"?

54. If the opposite poles of two permanent magnets of the horse-shoe form, having the same attractive and repulsive force, be placed near each other, and a piece of magnetized soft iron be suspended between them, will they produce any motion in that soft iron?

55. What is the most powerful magnetic force, the attractive or repulsive?

56. Is it possible to bring the two to act together without more complicated machinery than is necessary to make one available?

57. By which of these forces are the receiving magnet and the register worked in Morse's electro-magnetic telegraph? If by the attractive force, does it not give sufficient power for the purpose of making sounds or signs for telegraphic purposes?

58. If more power were wanted, could it not be obtained in a more simple manner, by adding one or more cups to the local battery, than by introducing permanent magnets, and complicating the machinery, for the purpose of bringing the repulsive force in aid of the attractive?

59. If a machine give sufficient power for the end to be accomplished, is it not a positive injury to make the machinery more complicated for the purpose of increasing the power?

60. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this, your examination, or the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

(Deposition of Henry W. Faxon, to wit:)

Deposition of H. W. Faxon.

S. F. B. Morse and others, complainants,
vs.
H. O'Rielly and others, defendants.

In pursuance of the accompanying and annexed commission from the district court of the United States, in and for the Kentucky district, addressed to any justice or judge of any of the courts of the United States, &c., I, Morgan W. Brown, judge of the district court of the United States for the districts of East, Middle, and West Tennessee, have caused Henry W. Faxon, a witness on behalf of the complainants in the above stated cause, to come before me, at my own house in Nashville, Tennessee, on the 18th of May, 1849, and having diligently examined him on oath, and upon the interrogatories hereto annexed, caused his answers thereto to be reduced to writing in his own

hand, as follows, the numbers affixed to his answers corresponding with the numbers of the interrogatories, as follows:

1. My age is twenty-three years; by profession an operator; my residence at Nashville, Tennessee.

2. I am. I became acquainted with it some two or three years since in the city of Buffalo, in the office of the Buffalo and Canada Junction Telegraph Company, on the line from Buffalo to Toronto, and from thence to Quebec.

3. By imprinting in the form of dots and lines.

4. He did not.

5. He did not.

6. (See drawing annexed) marked Morse's telegraph.

7. He proposed (at a date not recollected) to use portable types. He also proposed the use of a pencil, and also of marking the characters with ink.

8. He was to employ two circuits, a main circuit and an independent or local circuit.

9. Know nothing, except from report.

10. I have not.

15. The line built through from Louisville to Nashville was finish-[ed] some time in March or April, 1848. The persons employed [in] it since that time, to my knowledge, were P. P. Peck, E. L. Witman, D. Regglesworth, and Mr. Beal. I do not know who had charge at Louisville. The line was intended as a telegraph line, for the purpose of communicating intelligence by electricity, and was known in Nashville as the "People's line."

16. The line was built by Amos Kendall et als., Wm. Tanner and T. P. Shaffner as contractors, and finished in May, 1848, when it commenced operations, and has been working since, with the exceptions of the interruptions a telegraph line is subject to.

17. When their office was first opened, a machine was produced which signally failed. The same principle was involved as in the present instrument, but the arrangement was such as to prevent its fulfilling any duty whatever. Some delay occurred on this account. Some weeks after, another instrument was produced, similar in every respect, except in the arrangement of the pen lever, to the one now in use here, and changed their receiving magnet, which worked by deflecting needles for the "mutator." From that time, until enjoined by Judge Monroe of Kentucky, they continued to transmit intelligence on their wire.

18. Have never seen or entered the office at Louisville.

[19 and 20.] See answer 18.

21. I have visited their office frequently; the first time as an operator; the next time I was admitted to take a view of the instrument, from which I made a drawing at the request of the hon. H. M. Watterson, then superintendent of the Louisville line. Do not recollect the exact date. (See drawing annexed.)

22. I was not.

23. I am. Know that it will perform the duty of telegraphing instruments. My knowledge is acquired by seeing it work at different times.

24. Am acquainted with the invention patented to S. F. B. Morse as a telegraph. Have not read his patents. Have seen his instruments for the transmission of intelligence by electricity in operation.

25. See drawing annexed.

26. I think they are.

27. They produce the same general results upon the same principle; they both imprint on the paper, but I think this result obtained on the "Columbian" is inferior to that produced on Morse's instrument.

28. The principle is identically the same. They use a reverse current around the coil in the register, placed between two permanents, and pretend to use the repulsive action of the bar as well as the attractive. If so, the permanent magnet "H" in the drawing is useless; for if the repulsive action is used, why will not the permanent magnet "G" repel the bar "F" when the current is reversed over the coil?

29. They are throughout.

30. They do not; on the contrary, they are decidedly inferior.

31. Merely in arrangement, and using a reverse current for bringing the pen lever back to its position, instead of a spring, as is used in Morse's register.

32. In the use of the "electro-magnet" within the coil as the motive power.

33. They differ in the arrangement of the machinery merely, and resemble each other in using pieces of soft iron, made magnets by a current of electricity thrown around them, as the motive power.

34. The receiving magnet in Morse's telegraph being capable of producing but a slight movement, from the fact that the action of electricity over a long wire is very much weakened, and the motion in itself so produced could not be made useful for writing purposes, as it is not strong enough to make an impression; but it is made the means of closing a second or local circuit connected with *with* the magnets in the register; which wire being very short, and the electricity of the local battery having but a short distance to traverse, a strong and available electro-magnet is obtained, which produces the movement in the register. The same will apply to the mutator and register.

35. Either of them, the register and receiving magnet, the "mutator" or register, separated, are useless; connected, are the means of transmitting or receiving intelligence.

36. It is.

37. I do not think they are; soft iron or steel might supply their place.

38. The spring would be an equivalent to the permanent magnet, in the one case, and more than an equivalent; it could always be relied upon—the battery often gives out. Having never tried the experiment with a piece of soft iron, I am not prepared to state, but think it would.

39. I think it does.

40. From the impression made upon the paper I should say a disadvantage.
41. It is.
42. The second is useless.
43. It is not.
44. There is.
45. I think it would.
46. It is the object of both arrangements to endeavor to make an impression; no difficulty in obtaining power.
47. I do not think they differ in this respect.
48. I do not think it is.
49. By drawing it in one direction over an electro-magnet.
50. By throwing around it a current of electricity, through a coil of insulated wire.
51. I am not informed on this subject.
52. Both magnetic powers.
53. A means of producing motion.
54. No effect will be produced if the magnets are same size and power.
55. The attractive, as far as I have experience.
56. No, I think not.
57. The attractive; it gives sufficient power.
58. I think it could.
59. It is.
60. Nothing, except that the very act of hiding the helices of the mutator under a cover of brass, when it is well known that they are not affected by light, heat, or the atmosphere, was proof positive, in my opinion, that an infringement was intended and carried out.

HENRY W. FAXON,
Operator, Nashville.

UNITED STATES OF AMERICA,
Middle district of Tennessee, ss:

I, Morgan W. Brown, judge of the district court of the United States for the eastern, middle, and western districts of Tennessee, do hereby certify, that the above deposition of Henry W. Faxon was taken by me, and signed by the deponent in my presence, on the day and at the place specified in the caption of the same; that I am not of counsel for either of the parties, nor interested in said suit; that the said deposition was not out of my possession after it had been so taken, nor altered, and was by me deposited in the post-office at Nashville, directed to the clerk of the district court for the Kentucky district, at Frankfort, in the State of Kentucky.

Given under my hand the 18th of May, 1849.

MORGAN W. BROWN.

Interrogatories.

Interrogatories to be propounded to witnesses on the part of the complainants.

1. What is your age, profession, and residence?

2. Are you acquainted with the invention called Morse's Electro-magnetic Telegraph? If yea, state when, where, and under what circumstances you became acquainted with it.

3. How did Professor S. F. B. Morse propose to communicate intelligence at a distance; was it by an evanescent sign, or by imprinting the sign at a distance?

4. Did or not Professor Morse describe to you any apparatus, or parts of apparatus, of a telegraph; if yea, when and where did he do so?

5. Did or not he ever show to you any apparatus or machine in operation; and if yea, when and where did he do so?

6. Please exhibit and annex to your deposition a drawing or drawings, delineating the said apparatus or machine so shown to you, and describe the operation of the said machine.

7. Did or not Professor Morse, to your knowledge, ever have or propose any other mode of marking signs at a distance; and if yea, what was that method, and when did he propose so?

8. Did he employ, or propose to employ, a single circuit or conductor, or more than one?

9. State whatever else you may know respecting the invention of Professor S. B. F. Morse of the Electro-magnetic Telegraph, the dates, and all the particulars in relation to its inception, progress, and completion.

10. Have you read the letters patent of the U. States, issued to S. F. B. Morse, on the 13th June, 1848, for a new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism, (being a second reissue of the patent issued to said Morse originally on the 20th day of June, 1840,) together with the specifications thereto annexed? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibits a description of the invention in such full, clear, and exact terms as would enable you to construct and use the same.

11. State whether or not, in your opinion, any person skilled in the art or science to which the said invention appertains, or with which it is most nearly connected, would be enabled, from the specification and drawings annexed to the said patent, to construct and use said invention.

12. Have you read the letters patent issued to S. F. B. Morse, on the 13th June, 1848, for an improvement in electro-magnetic telegraphs, being a reissue of a patent issued to said Morse on the 11th April, 1846, with the specifications annexed thereto? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the said patented im-

provement in such full and clear terms as would enable you to construct and use the same.

13. State whether or not, in your opinion, any person skilled in the art or science to which said patented improvement is most nearly connected, would be enabled, from said last named specifications and drawings, to construct and use the said improvement.

14. State whether or not, in your opinion, the said last named specification does clearly and sufficiently show in what said improvement consists, and distinguish what is new from what is old.

15. State what you may know respecting the erection of a line of telegraph by the defendant, H. O'Rielly, and those employed by him, from Louisville, Kent'y, to Nashville, Tennessee, when the same was built, what is the nature of said line, and what it was commonly called.

16. State in like manner what you may know respecting the building of a line of telegraphs between the same points by or for the complainants; when it was done, and the nature of the same; when it was put in operation, and whether it has continued to operate.

17. State what you may know respecting the mode in which the defendants put and kept their said line in operation, and all the circumstances attending the same.

18. State the situation of the terminus and office of the defendant's said line in Louisville, and whether and when you visited the same.

19. Describe the apparatus and machinery you observed in the said office, and annex a drawings or drawing of the same, and explain as fully as you can the mode of its operation.

20. What was the said apparatus called, and whose invention was it said to be?

21. Have you at any time, and when, visited the office at the Nashville end of the line of the defendants? And if yea, describe the apparatus and machinery used in the said office for telegraphing as fully and clearly as you can, together with its mode of operation.

22. Were you present at the hearing before his honor, the district judge of Kentucky, in August and September, 1848, of the motion for an injunction in this case? If yea, state whether any instrument for telegraphing was exhibited on the part of the defendants; and if yea, what was it called, and in what, if in any, respect did it differ from the instrument in the office of the defendants at Louisville.

23. Are you acquainted with the instrument called Barnes and Zook's telegraph, said to be invented by Barnes and Zook, and its mode of operation? If yea, state the extent of your knowledge upon this subject, and when, where, and how you acquired the same.

24. Are you acquainted with the inventions patented to S. F. B. Morse by the U. States? Have you read his patents issued on the 13th June, 1848, and have you seen his said invention in operation.

25. Describe the telegraph of Morse and that of Barnes and Zook, embracing the whole of each machine with all its parts, from the main battery to the register, describing the functions of each part, and annex

to your answers such drawings of both instruments as may be useful to explain them and facilitate the understanding of your answers.

26. Examine the drawings now exhibited to you, marked "drawings of Barnes and Zook's telegraph," with the explanatory notes, and having written your name and the date of taking this deposition thereon, please to state upon such examination, or upon your knowledge of the instrument itself from having seen the same, (naming which,) whether or not, in your opinion, the essential principles of the instrument of Barnes and Zook are the same as those of Morse's instruments.

27. Do the two instruments produce the same or different results upon the same or different principles?

28. If the instrument of Barnes and Zook differs, in your opinion, from that of Morse what is the nature of these differences, and do they effect the essential principles of the two?

29. State whether, in your opinion, the essential principles of Morse's instrument is or is not involved in that of Barnes and Zook.

30. If, in your opinion, the instrument of Barnes and Zook differs from that of Morse, as patented, do those differences, in your opinion, constitute any improvement.

31. State in what the two registering instruments appear to differ.

32. State in what do they appear to resemble each other.

33. State in what the two instruments, called the mutator and the receiving magnet, appear to differ, and in what they appear to resemble each other.

34. What is the object to be attained by the separate pieces of apparatus in each instrument—the register, the mutator, and the receiving magnet?

35. What is the object to be attained by the combination of the two parts of the apparatus in each, to wit, by the combination of the register and the receiving magnet in the one case, and the register and the mutator in the other?

36. Is the power of electro-magnetism in the two instruments essential to put either of them in operation?

37. Are the permanent magnets in the Columbian essential to the ultimate end to be attained by both instruments, to wit, the marking of characters at a distance?

38. Would a spring be a mechanical equivalent for one of the permanent magnets, and a piece of soft iron an equivalent for the other?

39. Does the mutator and the receiving magnet accomplish the same result by substantially the same means?

40. Is there an advantage or a disadvantage in having the magnet move instead of the armature, in the mutator and register of the Columbian?

41. Is it or not a well established law of mechanics that a less weight is moved with less force than a greater?

42. The mutator breaks and closes two local or "resident" circuits, while the receiving magnet breaks and closes but one; is the same end

which is attained by each better secured by multiplying the circuits, or is the second a needless addition?

43. By Morse's receiving magnet, when a single local circuit is closed, an electro-magnet is produced in that circuit, which directly marks by attracting an armature placed near the poles of the magnet. When the circuit is broken, and the magnetic attraction ceases, a spring returns the armature to its normal position. Is the second circuit of the mutator of any other use than to be an equivalent of the spring in the receiving magnet?

44. In the action of the electro-magnet with the permanent magnets, in the Columbian, is there not attraction as well as repulsion?

45. Would or not a piece of unmagnetic iron, placed in the position of one of the permanent magnets, and a spring substituted for the other permanent magnet, produce the same effects of attraction and repulsion, though it may be in less degree?

46. Is or not the object of both arrangements of electro-magnets in the two instruments the same, to wit, to obtain power to mark; and in Morse's arrangements is there any difficulty in obtaining more power than is necessary to accomplish that object?

47. Is there any advantage in this respect in the Columbian arrangement over the arrangement in Morse's; is there any disadvantage?

48. Is the contrivance of the permanent magnets anything else than a less convenient mode of applying the electro-magnetic power?

49. How is the permanent magnet, often called the steel magnet, made magnetic?

50. How is the electro-magnet made magnetic?

51. Is or is not the magnetic power or force of the steel magnet and of the electro-magnet essentially the same? If not, at what point, having regard to the density of the metal magnetized, does electro-magnetism cease and permanent magnetism commence?

52. Is it settled among scientific men whether the attraction and repulsion of magnets are different forces, or powers of the same force operating in different directions? Are or are not both magnetic powers, and one as much so as the other?

53. What is meant among scientific men by the terms "a motive power?"

54. If the opposite poles of two permanent magnets of the horse-shoe form, having the same attractive and repulsive force, be placed near each other, and a piece of magnetized soft iron be placed between them, will they produce any motion in that soft iron?

55. What is the most powerful magnetic force, the attractive or repulsive?

56. Is it possible to bring the two to act together without more complicated machinery than is necessary to make one available?

57. By which of these forces are the receiving magnet and the register worked in Morse's electro-magnetic telegraph? If by the attractive force, does it not give sufficient power for the purpose of making sounds or signs for telegraphic purposes?

58. If more power were wanted, could it not be obtained in a more simple manner, by adding one or more cups to the local battery, than by introducing permanent magnets, and complicating the machinery for the purpose of bringing the repulsive force in aid of the attractive?

59. If a machine gives sufficient power for the end to be accomplished, is it not a positive injury to make the machinery more complicated for the purpose of increasing the power?

60. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

(*Deposition of Andrew Prosch, to wit:*)

In chancery.

Before the circuit court of the U. States, for the district of Kentucky.

SAMUEL F. B. MORSE et al., complainants,
vs.
HENRY O'RIELLY et al., defendants.

Deposition of A. Prosch.

Depositions of witnesses examined before the mayor of the city of New York, under and pursuant to the commission and interrogatories hereunto annexed, at the office of the mayor in the said city, on the 23d day of April, A. D. 1849.

Andrew Prosh, a witness produced on the part of the complainants, being duly sworn upon the holy gospel of the evangelists, that the answers which he should give to the respective interrogatories to the said commission annexed, and each and every of them, should be the truth, the whole truth, and nothing but the truth, after being thus duly sworn, doth depose and say as follows:

In answer to the first interrogatory he says: I am aged thirty-two years and upwards; I am a mathematical and philosophical instrument maker, and reside in the city of New York.

In answer to the second interrogatory he says: I am acquainted with the invention called Morse's Electro-magnetic Telegraph; I became acquainted with the same in the city of New York in the [year] A. D. 1839, and under the following circumstances: I was then engaged in the business above stated in connexion with a brother of mine, now residing in the State of New Jersey. Professor S. F. B. Morse in that year called upon my brother for the purpose of having him construct for him an electro-magnetic telegraph apparatus, and then stated in detail the description of the requisite instruments, and other apparatus necessary for such telegraph, and in that way I then became fully possessed of the form, plan, and general construction of said instrument and apparatus.

In answer to the third interrogatory he says: By imprinting the sign at a distance.

In answer to the fourth interrogatory he says: Professor S. F. B. Morse did, in the year 1839, and at the city of New York, describe the apparatus and all the various parts of the apparatus of such telegraphic instruments as above stated.

In answer to the fifth interrogatory he says: He did so at the city of New York, at his office on Nassau street, in the year one thousand eight hundred and forty-one.

In answer to the sixth interrogatory he says: The drawing annexed to the latters patent of Professor Morse, under date of 11th April, 1846, shows fully and clearly, and accurately delineates, the said apparatus and machine then exhibited to me and seen in operation. The specification annexed to the said letters patent in connexion with said drawing describes as minutely and accurately as it is possible for me to do, the structure as well as the operation of said machine and apparatus, and the result produced by its operation.

In answer to the seventh interrogatory he says: He did not.

In answer to the eighth interrogatory he says: He proposed to employ a single circuit, and no more.

In answer to the ninth interrogatory he says: I know that Professor Morse as early as the year 1839 had matured and accurately delineated an electro-magnetic telegraphic machine, and had one in operation in all respects similar to the one described in the specification annexed to the letters patent of April 11th, 1846, and a drawing accompanying the same, and that for some time previous to the year 1839 he claimed to have discovered the art of printing at a distance by means of such machine and apparatus, and had made a model of such machine and apparatus.

In answer to the tenth interrogatory he says: I have. The said specifications, with the drawings referred to and accompanying the same, do exhibit a description of the invention in such full, clear, and exact terms as would enable me to construct and use the same.

In answer to the eleventh interrogatory he says: In my opinion, any person skilled in the art or science to which the said invention and apparatus appertains, or with which it is most nearly connected, would be enabled, from the specifications and drawings annexed to said letters patent, to construct and use the same.

In answer to the twelfth interrogatory he says: I have. The said specifications, with the drawings referred to and accompanying the same, do exhibit a description of the invention in such full, clear, and exact terms as would enable me to construct and use the same.

In answer to the thirteenth interrogatory he says: In my opinion, any person skilled in the art or science to which said invention and apparatus pertains, or with which it is most nearly connected, would be enabled, from the specifications and drawings annexed to said letters patent, to construct and use the said invention.

In answer to the fourteenth interrogatory he says: In my opinion, the last named specification does clearly and sufficiently shew in what

said improvement consists, and distinguishes what is new from what is old.

In answer to the fifteenth interrogatory he says: I have no actual knowledge as to that.

In answer to the sixteenth interrogatory he says: I have no actual knowledge as to that.

In answer to the seventeenth interrogatory he says: I have no actual knowledge as to that.

In answer to the eighteenth interrogatory he says: I have no actual knowledge as to that.

In answer to the nineteenth interrogatory he says: I have no actual knowledge as to that.

In answer to the twentieth interrogatory he says: I have no actual knowledge as to that.

In answer to the twenty-first interrogatory he says: I have no actual knowledge as to that.

In answer to the 22d interrogatory he says: I was not.

In answer to the 23d interrogatory he says: I have no knowledge, except that derived from a drawing I have seen of that instrument; I first saw said drawing this day, and have signed my name to it at the date of the taking of this deposition.

In answer to the 24th interrogatory he says: I am acquainted with it; I have seen said letters patent; I have seen said invention in operation.

In answer to the 25th interrogatory he says: The description of the Morse's telegraph and its various parts cannot be given more accurately or fully than it is described in the specifications, and delineated in the drawing annexed to his letters patent. The machine of Barnes and Zook, as delineated in the drawing which I have seen and signed, above referred to by me, and annexed to this deposition, is substantially in all of its construction the same in principle, and producing precisely the same result as that of Professor Morse. The distinguishing difference in its general mechanical structure is that of two batteries instead of one, to produce the effect of imprinting with the pen the characters on the paper, and withdrawing the pen from the paper upon the same principles of Professor's Morse's instruments. The second battery in Barnes and Zook's machine is used to produce the effect to withdraw the pen from the paper by the application of electrical fluid. The same result is produced by Morse's instrument by the withdrawal of the electrical fluid and the use of a spiral spring acting upon the lever of the pen holder, which forces the pen back from the paper the instant the impression is made, without the use of any counter current of electricity. Perhaps I shall be better understood by stating, that the result in both instruments is the movement of the pen and withdrawing the same from the paper after the impression is made. Morse's instrument withdraws the pen from the paper by a small spiral spring. Barnes and Zook employ a second local circuit and a battery for the same purpose, producing the same effect. The electro-magnetism of one circuit forces

the pen against the paper, and that of the other circuit forces it back. Both of the fixed magnets are powerless of themselves to move the pen or to attract the armature attached to the pen lever, until they are magnetized by one of the local circuits. The magnetism produced by the current is the power in both instruments, which produces the result, whatever may be the mechanical means or structure.

In answer to the 26th interrogatory he says: Upon examination and careful study of the drawing signed by me, and above referred to, not having seen the instrument itself, and after having traced out from the said drawing the form and structure of the instrument therein delineated, I am clearly of the opinion that the essential principles of the instrument of Barnes and Zook are the same as those of Morse's instrument.

In answer to the 27th interrogatory he says: That each are designed to and do produce the same results upon precisely the same general principles, and not different.

In answer to the 28th interrogatory he says: I do not think there is any difference in the instruments either in principle or effect. They do each produce the same result upon the same principles. There is, it is true, a slight difference in structure. Barnes and Zook use a crooked or angular, instead of a straight, pen lever; they also use two batteries instead of one to produce the same result; they also use a carriage for the pen point instead of a hinge; they use a counter current to withdraw the pen instead of a spiral spring, which in Morse's instrument produces the same result.

In answer to the 29th interrogatory he says: I am clearly of the opinion that all the essential principles of Morse's instrument, as patented, are involved in Barnes and Zook.

In answer to the 30th interrogatory he says: I do not think that there is any essential difference in the structure between the two instruments, as they are both the same in principle; nor do I believe there is any improvement by Barnes and Zook upon the instrument of Morse. On the contrary, I believe Morse's instrument the least complex, and by far the most preferable of the two.

In answer to the 31st interrogatory he says: The only perceivable difference between the two instruments is that stated by me above, in answer to the 28th interrogatory.

In answer to the 32d interrogatory he says: They resemble each other in all of their essential features and principles in all respects, except as stated by me in answer to the 28th interrogatory above.

In answer to the 33d interrogatory he says: They do not differ in principle nor in their results; they only differ as above stated, and in having what may be deemed a double electrical influence to produce the same effect upon the pen lever, which is effected in Morse's by the use of one battery and a spiral spring.

In answer to the 34th interrogatory he says: The object to be obtained by each is to cause, by the application of electricity, the imprint-

ing of permanent characters at a distance from the writer, and withdrawing the pen from the paper the moment the impression is made.

In answer to the 35th interrogatory he says: That of the application of the pen to the paper to make a permanent mark or impression in known signs or figures, and the withdrawal of the pen from the paper the moment the signs or figures are imprinted.

In answer to the 36th interrogatory he says: It is to both.

In answer to the 37th interrogatory he says: They are not.

In answer to the 38th interrogatory he says: It should.

In answer to the 39th interrogatory he says: They do.

In answer to the 40th interrogatory he says: There is no advantage; I believe there is a disadvantage.

In answer to the 41st interrogatory he says: I believe it is.

In answer to the 42d interrogatory he says: The same end is attained by each. It is not better secured by multiplying the circuits; and, in my opinion, the second is a needless addition, besides being more complicated and expensive.

In answer to the 43d interrogatory he says: It is not.

In answer to the 44th interrogatory he says: There is.

In answer to the 45th interrogatory he says: I think it would.

In answer to the 46th interrogatory he says: It is to obtain power to mark. In Morse's I do not conceive that there is any difficulty in obtaining more power than is necessary for that object.

In answer to the 47th interrogatory he says: I think there is no advantage. On the contrary, I believe there is a great disadvantage.

In answer to the 48th interrogatory he says: It is not.

In answer to the 49th interrogatory he says: One mode is by the application of electricity, and another is what is called the inductive mode.

In answer to the 50th interrogatory he says: By the same means.

In answer to the 51st interrogatory he says: I have understood it was.

In answer to the 52d interrogatory he says: I cannot say how it is settled by scientific men. My own opinion is that they are both magnetic powers, and that one is as much so as the other.

In answer to the 53d interrogatory he says: That which causes or produces motion or action.

In answer to the 54th interrogatory he says: I should think not, if it was as near to the one as to the other.

In answer to the 55th interrogatory he says: I do not know, and I doubt whether it has been definitely determined. My own opinion is that they would be equal upon objects in the same proximity.

In answer to the 56th interrogatory he says: I believe it is not possible.

In answer to the 57th interrogatory he says: By the attractive, and it does give sufficient power for those purposes.

In answer to the 58th interrogatory he says: I believe that it could.

In answer to the 59th interrogatory he says: I should think it was.

In answer to the 60th interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be of benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

ANDREW PROSCH.

Sworn to before me this 23d day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of J. Stokell.

Deposition of John Stokell, taken under interrogatories copied herein on page 448, to wit:

John Stokell, a witness produced on the part of the complainants, being duly sworn upon the holy gospel of the evangelists, that the answers which he should give to the respective interrogatories to the said commission annexed, and each and every one of them, should be the truth, the whole truth, and nothing but the truth, after being thus duly sworn, doth depose and say as follows:

In answer to the 1st interrogatory he says: I am fifty-three years of age; a clock and philosophical instrument maker; and reside in the city of New York, No. 26, Plato street.

In answer to the second interrogatory he says: I am acquainted with the invention called Morse's Electro-magnetic Telegraph. I became acquainted with the same in the city of New York in the year A. D. 1842, under the following circumstances: Professor Morse called on me at that time with a model of his instrument, wishing me to make two others after it, and he then detailed to me a description of the requisite instruments and apparatus necessary for such telegraph, and in that manner I became acquainted with the form, plan, and general construction of said instrument and apparatus.

In answer to the third interrogatory he says: By imprinting the same at a distance.

In answer to the 4th interrogatory he says: Professor S. F. B. Morse did in the year 1842, and at the city of New York, describe the apparatus of such telegraphic instrument as above stated.

In answer to the 5th interrogatory he says: He did so at the city of New York, at his office on Nassau street, in the year 1842.

In answer to the 6th interrogatory he says: The drawings annexed to the letters patent of Professor Morse, under date of April 11th, 1846, show fully and clearly, and accurately delineates, the said apparatus and machine then exhibited to me and seen in operation. The specification annexed to the said letters patent, in connexion with said drawings, describe as minutely and accurately as it is possible for me to do,

the structure as well as the operation of the said machine and apparatus, and the result produced by its operation.

In answer to the 7th interrogatory he says: He did not.

In answer to the eighth interrogatory he says: He proposed to employ a single circuit, and no more.

In answer to the 9th interrogatory he says: I know that Professor Morse, as early as the year 1842, had matured and accurately delineated an electro-magnetic telegraphic machine, and had one in operation in all respects similar to the one described in the specification annexed to the letters patent of April 11th, 1846, and a drawing accompanying the same; and that for some time previous to the year 1842 he claimed to have discovered the art of writing at a distance by means of such machine and apparatus, and had made a model of such machine and apparatus.

In answer to the 10th interrogatory he says: I have. The said specifications, with the drawings referred to, and accompanying the same, do exhibit a description of the invention in such full, clear, and exact terms as would enable me to construct and use the same.

In answer to the 11th interrogatory he says: In my opinion any person skilled in the art or science to which said invention and apparatus appertains, or with which it is most nearly connected, would be enabled, from the specifications and drawings annexed to said letters patent, to construct and use the same.

In answer to the 12th interrogatory he says: I have. The said specifications, with the drawings referred to, and accompanying the same, do exhibit a description of the invention in such full, clear, and exact terms as would enable me to construct and use the same.

In answer to the 13th interrogatory he says: In my opinion any person skilled in the art or science to which the said invention and apparatus pertain, or with which it is most nearly connected, would be enabled, from the specifications and drawings annexed to said letters patent, to construct and use the said invention.

In answer to the 14th interrogatory he says: In my opinion the last named specification does clearly and sufficiently show in what said improvement consists, and distinguishes what is new from what is old.

In answer to the 15th interrogatory he says: I have no actual knowledge as to that.

In answer to the 16th interrogatory he says: I have no actual knowledge as to that.

In answer to the 17th interrogatory he says: I have no actual knowledge as to that.

In answer to the 18th interrogatory he says: I have no actual knowledge as to that.

In answer to the 19th interrogatory he says: I have no actual knowledge as to that.

In answer to the 20th interrogatory he says: I have no actual knowledge as to that.

In answer to the 21st interrogatory he says: I have no actual knowledge as to that.

In answer to the 22d interrogatory he says: I was not.

In answer to the 23d interrogatory he says: I have no knowledge, except that derived from a drawing I have seen of that instrument. I have seen said drawing this day, and have signed my name to it at the date of the taking of this deposition.

In answer to the 24th interrogatory he says: I am acquainted with it; I have read said letters patent; I have seen said invention in operation.

In answer to the 25th interrogatory he says: The description of the Morse's telegraph, and its various parts, cannot be given more accurately or fully than it is described in the specification, and delineated in the drawing annexed to his letters patent. The machine of Barnes and Zook, as delineated in the drawing which I have seen and signed, above referred to by me, and annexed to this deposition, is substantially, in all of its construction, the same in principle, and producing precisely the same result as that of Professor Morse. The distinguishing difference in its mechanical structure is that of the use of two batteries instead of one, to produce the effect of imprinting with the pen the characters on the paper, and withdrawing the pen from the paper, upon the same principles of Professor Morse's instrument. The second battery in Barnes and Zook's instrument is used to produce the effect to withdraw the pen from the paper by the application of electrical fluid. The same result is produced by Morse's instrument by the withdrawal of the electrical fluid and the use of a spiral spring, acting upon the lever of the pen holder, which forces the pen back from the paper the instant the impression is made, without the use of any counter current of electricity. Perhaps I shall be better understood by stating, that the result in both improvements is the movement of the pen, and withdrawing the same from the paper after the impression is made. Morse's instrument withdraws the pen from the paper by a small spiral spring. Barnes and Zook employ a second local circuit and a battery for the same purpose, producing the same effect. The electromagnetism of one circuit forces the pen against the paper, and that of the other circuit forces it back. Both of the fixed magnets are powerless of themselves to move the pen, or to attract the armature attached to the pen lever, until they are magnetized by one of the local circuits. The magnetism produced by the current is the power in both instruments which produces the result, whatever may be the mechanical means or structure.

In answer to the 26th interrogatory he says: Upon examination and careful study of the drawing signed by me and above referred to, not having seen the instrument itself, and after having traced out from the said drawing the form and structure of the instrument therein delineated, I am clearly of the opinion that the essential principles of the instrument of Barnes and Zook are the same as those of Morse's instrument.

In answer to the 27th interrogatory he says: That each are designed

to and do produce the same results upon precisely the same general principles, and not different.

In answer to the 28th interrogatory he says: I do not think there is any difference in the instruments, either in principle or effect. They do each produce the same result upon the same principles; there is, it is true, a slight difference in structure. Barnes and Zook use a crooked or angular, instead of a straight, pen lever; they also use two batteries instead of one, to produce the same result. They also use a carriage for the pen point, instead of a hinge; they also use a counter current to withdraw the pen, instead of a spiral spring, which, in Morse's instrument, produces the same result.

In answer to the 29th interrogatory he says: I am clearly of the opinion that all the essential principles of Morse's instrument, as patented, are involved in that of Barnes and Zook.

In answer to the 30th interrogatory he says: I do not think that there is any essential difference in the structure between the two instruments, as they are both the same in principle; nor do I believe there is any improvement by Barnes and Zook upon the instrument of Morse. On the contrary, I believe Morse's instrument the least complex, and by far the most preferable of the two.

In answer to the 31st interrogatory he says: The only perceivable difference between the two instruments is that stated by me above, in answer to the 28th interrogatory.

In answer to the 32d interrogatory he says: They resemble each other in all their essential features and principles in all respects, except as stated by me in answer to the 28th interrogatory above.

In answer to the 33d interrogatory he says: They do not differ in principle nor in their results. They only differ as above stated, and in having what may be deemed a double electrical influence to produce the same effect upon the pen lever, which is effected in Morse's by the use of one battery and a spiral spring.

In answer to the 34th interrogatory he says: The object to be attained by each is to cause, by the application of electricity, the imprinting of permanent characters at a distance from the writer, and withdrawing of the pen from the paper the moment the impression is made.

In answer to the 35th interrogatory he says: That of the application of the pen to the paper to make a permanent mark or impression in known signs or figures, and the withdrawal of the pen from the paper, the moment the signs or figures are imprinted.

In answer to the 36th interrogatory he says: It is to both.

In answer to the 37th interrogatory he says: They are not.

In answer to the 38th interrogatory he says: It would.

In answer to the 39th interrogatory he says: They do.

In answer to the 40th interrogatory he says: There is no advantage; I believe there is a disadvantage.

In answer to the 41st [interrogatory] he says: I believe it is.

In answer to the 42d interrogatory he says: The same end is attained by each. It is not better secured by multiplying the circuits; and in

my opinion the second is a needless addition, besides being more complicated and expensive.

In answer to the 43d interrogatory he says: It is not.

In answer to the 44th interrogatory he says: There is.

In answer to the 45th interrogatory he says: I think it would.

In answer to the 46th interrogatory he says: It is to obtain power to mark. In Morse's I do not conceive that there is any difficulty in obtaining more power than is necessary for that object.

In answer to the 47th interrogatory he says: I think there is no advantage; on the contrary, I believe there is a disadvantage.

In answer to the 48th interrogatory he says: It is not.

In answer to the 49th interrogatory he says: One mode is by the application of electricity, and another is what is called the inductive mode.

In answer to the 50th interrogatory he says: By the same means.

In answer to the 51st interrogatory he says: I have understood it was.

In answer to the 52d interrogatory he says: I cannot say how it is settled by scientific men; my own opinion is, that they are both magnetic powers, and that one is as much so as the other.

In answer to the 53d interrogatory he says: That which causes or produces motion or action.

In answer to the 54th interrogatory he says: I should think not, if it was as near to the one as the other.

In answer to the 55th interrogatory he says: I do not know, and I doubt whether it has been definitely determined; my own opinion is, that they would be equal upon objects in the same proximity.

In answer to the 56th interrogatory he says: I believe it is not possible.

In answer to the 57th interrogatory he says: By the attractive; and it does give sufficient power for that purpose.

In answer to the 58th interrogatory he says: I believe that it would.

In answer to the 59th interrogatory he says: I should think it was.

In answer to the 60th interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be of benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause.

JOHN STOKELL.

Sworn to before me, this 24th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of William Constable.

(Deposition of William Constable, taken under interrogatories copied herein on page 448, to wit:)

William Constable, a witness, produced and examined under, and pursuant to, the commission and interrogatories hereunto annexed on

the part of the plaintiffs in said commission, and interrogatories named in a certain cause, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants, being first duly sworn upon the holy evangelists of Almighty God, that the several answers that he should give to each and every of the said interrogatories hereunto, and to said commission annexed, should be the truth, the whole truth, and nothing but the truth, the said witness says:

In answer to the 1st interrogatory he says: I am a merchant, residing in the city of New York, aged 37 years and upwards.

In answer to the 2d interrogatory he says: Yes; I became acquainted with Professor S. F. B. Morse's invention of the Electro-magnetic Telegraph in the month of October and November, 1832, on board of the packet ship Sully, whereof Captain Wm. H. Pell was master, on her voyage from Havre to New York.

In answer to the 3d interrogatory he says: It was by imprinting signs at a distance.

In answer to the 4th interrogatory he says: Yes; at the same time and place he showed me drawings of apparatus which was to put in operation his invention. The part which I distinctly remember is a system of dots, and spaces, and lines, which he proposed imprinting at a distance. The parts of the machinery I did not retain in my memory, as at that time the plan was by me deemed visionary.

In answer to the 5th interrogatory he says: No.

In answer to the 6th interrogatory he says: I only remember the dots, spaces, and lines, arranged to signify numerals and letters.

In answer to the 7th interrogatory he says: I have no recollection.

In answer to all the rest of the said interrogatories, from the 8th to the 59th, both inclusive, he says: I know nothing of any of the matters inquired about in either of said interrogatories, except the 22d, in answer to which I say I was not.

In answer to the 60th interrogatory he says: I do not know, and cannot set forth, any other matter or thing which may be a benefit or advantage to the parties at issue, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

W. CONSTABLE.

Sworn before me, this 26th day of April, A. D. 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of J. F. Foss.

(Deposition of James F. Foss, taken under the interrogatories copied herein on page 448, to wit:)

James F. Foss, a witness, produced and examined under, and pursuant to, the commission and interrogatories hereunto annexed on the part of the plaintiffs in said commission and interrogatories named, in a

my opinion the second is a needless addition, besides being more complicated and expensive.

In answer to the 43d interrogatory he says: It is not.

In answer to the 44th interrogatory he says: There is.

In answer to the 45th interrogatory he says: I think it would.

In answer to the 46th interrogatory he says: It is to obtain power to mark. In Morse's I do not conceive that there is any difficulty in obtaining more power than is necessary for that object.

In answer to the 47th interrogatory he says: I think there is no advantage; on the contrary, I believe there is a disadvantage.

In answer to the 48th interrogatory he says: It is not.

In answer to the 49th interrogatory he says: One mode is by the application of electricity, and another is what is called the inductive mode.

In answer to the 50th interrogatory he says: By the same means.

In answer to the 51st interrogatory he says: I have understood it was.

In answer to the 52d interrogatory he says: I cannot say how it is settled by scientific men; my own opinion is, that they are both magnetic powers, and that one is as much so as the other.

In answer to the 53d interrogatory he says: That which causes or produces motion or action.

In answer to the 54th interrogatory he says: I should think not, if it was as near to the one as the other.

In answer to the 55th interrogatory he says: I do not know, and I doubt whether it has been definitely determined; my own opinion is, that they would be equal upon objects in the same proximity.

In answer to the 56th interrogatory he says: I believe it is not possible.

In answer to the 57th interrogatory he says: By the attractive; and it does give sufficient power for that purpose.

In answer to the 58th interrogatory he says: I believe that it would.

In answer to the 59th interrogatory he says: I should think it was.

In answer to the 60th interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be of benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause.

JOHN STOKELL.

Sworn to before me, this 24th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of William Constable.

(Deposition of William Constable, taken under interrogatories copied herein on page 448, to wit:)

William Constable, a witness, produced and examined under, and pursuant to, the commission and interrogatories hereunto annexed on

the part of the plaintiffs in said commission, and interrogatories named in a certain cause, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants, being first duly sworn upon the holy evangelists of Almighty God, that the several answers that he should give to each and every of the said interrogatories hereunto, and to said commission annexed, should be the truth, the whole truth, and nothing but the truth, the said witness says:

In answer to the 1st interrogatory he says: I am a merchant, residing in the city of New York, aged 37 years and upwards.

In answer to the 2d interrogatory he says: Yes; I became acquainted with Professor S. F. B. Morse's invention of the Electro-magnetic Telegraph in the month of October and November, 1832, on board of the packet ship Sully, whereof Captain Wm. H. Pell was master, on her voyage from Havre to New York.

In answer to the 3d interrogatory he says: It was by imprinting signs at a distance.

In answer to the 4th interrogatory he says: Yes; at the same time and place he showed me drawings of apparatus which was to put in operation his invention. The part which I distinctly remember is a system of dots, and spaces, and lines, which he proposed imprinting at a distance. The parts of the machinery I did not retain in my memory, as at that time the plan was by me deemed visionary.

In answer to the 5th interrogatory he says: No.

In answer to the 6th interrogatory he says: I only remember the dots, spaces, and lines, arranged to signify numerals and letters.

In answer to the 7th interrogatory he says: I have no recollection.

In answer to all the rest of the said interrogatories, from the 8th to the 59th, both inclusive, he says: I know nothing of any of the matters inquired about in either of said interrogatories, except the 22d, in answer to which I say I was not.

In answer to the 60th interrogatory he says: I do not know, and cannot set forth, any other matter or thing which may be a benefit or advantage to the parties at issue, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

W. CONSTABLE.

Sworn before me, this 26th day of April, A. D. 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of J. F. Foss.

(Deposition of James F. Foss, taken under the interrogatories copied herein on page 448, to wit:)

James F. Foss, a witness, produced and examined under, and pursuant to, the commission and interrogatories hereunto annexed on the part of the plaintiffs in said commission and interrogatories named, in a

certain cause wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants.

The said witness being first duly sworn on the holy evangelists of Almighty God, that the several answers he should make to each and every of the said interrogatories to said commission annexed should be the truth, the whole truth, and nothing but the truth, did duly depose and say as follows:

In answer to the 1st interrogatory he says: I am aged twenty-nine years, by occupation a telegrapher, and in charge of the New York office of the New York and Boston telegraph line, and I reside in the city of New York.

In answer to the 2d interrogatory he says: I am acquainted with Professor Morse's invention called Morse's Electro-magnetic Telegraph, and became so in the winter of 1845 and 1846, while employed in constructing a section of the New York and Boston telegraph line, between Springfield and Boston, and subsequently while located temporarily at Worcester, Massachusetts.

In answer to the 3d interrogatory he says: By imprinting the characters at a distance by the aid of electro-magnets.

In answer to the 4th interrogatory he says: He did so in the summer of 1846, in New York city.

In answer to the 5th interrogatory he says: He did in the summer of 1846, at his office in Nassau street, N. Y.

In answer to the 6th interrogatory he says: The drawing annexed to the letters patent of Professor Morse, under date of 11th April, 1846, shows fully and clearly, and accurately delineates, the said apparatus and machine then exhibited to me, and seen in operation. The specification annexed to the said letters patent, in connexion with said drawing, describes them as accurately as it is possible for me to do.

In answer to the seventh interrogatory he says: He did not to my knowledge.

In answer to the eighth interrogatory he says: He proposed to employ a single circuit or conductor only.

In answer to the ninth interrogatory he says: As early as the year 1842 I knew of the invention of Professor Morse's magnetic telegraph register, having then seen one in use by Dr. Boynton, which had been furnished to him by Professor Morse, and which Dr. Boynton then used in his lectures in illustrating Morse's Electro-magnetic Telegraph. As early as the year 1845 I saw Professor Morse's register and magnet in practical operation for telegraphic purposes in the city of New York.

In answer to the tenth interrogatory he says: Yes; I have read it, and the said specifications, with the drawings referred to and accompanying the same, do exhibit a description of the invention in such full, clear, and exact terms as would enable me to construct and use the same.

In answer to the eleventh interrogatory he says: Any person so skilled in the art or science to which the said invention appertains, or

with which it is most nearly connected, would be enabled, from the specification and drawings annexed to the said letters patent, to construct and use said invention.

In answer to the twelfth interrogatory he says: I have and the said specification and drawings do exhibit a description of the said patented improvement in such full and clear terms as would enable me to construct and use the same.

In answer to the thirteenth interrogatory he says: I believe any such person could construct and use the said improvement.

In answer to the fourteenth interrogatory he says: It does clearly and sufficiently shew in what said improvement consists, and does distinguish what is new from what is old.

In answer to the fifteenth interrogatory he says: I know that the said Henry O'Rielly has constructed a line of magnetic telegraph from Louisville, Kentucky, to Nashville and Memphis, Tennessee, which has been extended to New Orleans. Said line is constructed by the erection of posts, and the stretching of a line of iron wire thereon from Louisville, Kentucky, through the towns of Bardstown, New Haven, Glasgow, and Scottsville, Kentucky; and Gallatin and Nashville, Tennessee. That said line of telegraph has been in operation, and has been transacting telegraphic business for compensation. I am personally acquainted with Henry O'Rielly, and with many of those employed by him, and his associates in constructing the line of telegraph from Louisville, Kentucky, to Nashville, Tennessee; and also with those employed as operators and clerks, after its completion. It was called by them, and known as, the "People's line" of telegraph; was built between the first of January and first of May, 1848, and is in all respects constructed on the same principle as other lines in the country, though far inferior to many of them, owing to its being less substantially erected. I know personally John J. O'Rielly, Mr. Osler, Mr. Barnes, Mr. Zook, Mr. Witman, Mr. Hastings, Mr. Peck, and Mr. Beal, all of whom were engaged, during the spring and summer of 1848, at either the construction of, or in operating the said "People's line." I was from the 15th of February to the 5th of July, 1848, travelling through the States of Kentucky and Tennessee, employed by the patentees of Morse's telegraph to superintend the construction of a line of telegraph built through the same sections of country as the above "People's line" is, and thereby had ample opportunity to make myself familiar with the mode of construction of the apparatus used on, and the mode of operation of, the said "People's line," and the parties by whom constructed and operated.

In answer to the 16th interrogatory he says: I know that a line of magnetic telegraph was built by and for the complainants, between the months [of] January and July, 1848, through the States of Kentucky and Tennessee, and in nearly the same route as the People's line, and running through the same principal cities and towns. To the best of my knowledge it has continued to operate since that time, subject as

are all other lines in a new country, to frequent interruptions from falling timber and mischievous curiosity. I was employed by the complainants to aid in the operation of said line, and fitted up the offices on said line at Frankfort, Lexington, Louisville, and Nashville.

In answer to the 17th interrogatory he says: I know that they put it up and kept said line in operation, as has been stated by me in my answer to the 15th interrogatory.

In answer to the 18th interrogatory he says: The office of the said line in Louisville, Kentucky, and its terminus, is located at the corner of Market and Fourth, (or Eighth, I cannot state positively which,) streets, in the same building with that of the New Orleans and Ohio line office, on the 2d and 3d floor of the large building in which are the rooms of the Kentucky Historical library, the Louisville library, and the public reading-room; such was its location when I last visited Louisville in July, 1848, and I have not been advised of its removal. I visited said office frequently during the months of March, April, May, June, and July, 1848, and on several occasions witnessed the operating there of the "Columbian Telegraph instruments," claimed as the invention of Barnes and Zook.

In answer to the 19th interrogatory he says: The following is, according to the best of his recollection and belief, a correct description of the instrument used in said office when I was there, called the Columbian Telegraph, or of all the essential parts of the receiver, and the drawing annexed to my deposition, and upon which I have written my name and the date of the taking of this deposition, is an accurate drawing of the receiver then in use; that said description and drawing he believes to be correct in its main features, though I do not pretend to be perfectly accurate in every detail.

I will now proceed to the description. In the accompanying drawing fig. 1 represents an end view of the receiver, which consists of an upright brass frame A, fig. 1, and A A, fig. 2, fixed into a cross piece B, fig. 1 and 2, for the purpose of securing it to the table. Upon the upright A are fastened eight helices, marked on one side 1, 2, 3, and 4, in fig. 1, and on the other side of the upright A are these marks, 5, 6, 7, and 8.

Fig. 2 is a side view of the same instrument, and the corresponding helices, marked 1, 2, 3, and 4, in fig. 1, are similarly marked in fig. 2. The remaining helices, 5, 6, 7, and 8, are directly behind those marked 1, 2, 3, and 4, and are therefore hid. These helices are all connected together, and are in the circuit of the main wire. J represents one end of the main wire connected with the clamp screw n, and proceeds from them to f and to the helix 4, thence to helix 3, thence to helix 2, and thence to helix 1, thence to the helix behind, marked 5, in fig. 1, thence to helix 6, thence to helix 7, thence to helix 8, leaving the last helix it passes at g, to the clamp screw i, and thence to K, the other end of the main wire. Between the four helices on one side of the upright frame A, and the four helices on the other side of the frame, and also about half way from the extremities of these eight helices

there is an upright shaft or spindle S S S, whose upper axis is at H, a screw in the top part of the receiver frame A A, and whose lower axis or pivot rests in the metallic foot I; at four places on this vertical shaft or spindle are secured 8 steel needles, permanently magnetized, two being in the same place with each other, and at angles to each other, on the shaft, at less than right angles; and these four double needles correspond in their places on the shaft with the opening in the helices, so that their extremities may move freely in and out of the openings when affected by the galvanic current in the helices. These four double needles are represented at L, M, N, and O, fig. 2, on the vertical spindle S S S. On the spindle at M is fastened an arm projecting back, and to the end is fastened one end of the spiral spring N; the other end of this spring N is secured to the adjusting screw O, so that its elasticity is increased or diminished by turning the screw O to the right or left.

The object of this arm, screw, and spring is to cause the needles to resume their place when not acted upon by the galvanic current through the helices. Now, if the galvanic current is sent through or along the wires of these helices in the proper direction, the needles move in a direction in obedience to known laws, depending upon the mode of winding the helices, the polarity of the needles, and the direction of the current on the main line; and if the current is broken or the circuit opened, the needles will resume that position which is effected by the arm m, spring n, and screw o, and the stop of the connecting screw g.

On the same shaft or spindle S S S, at p, is a metallic arm fastened, and upon its end a platina or other metallic cross piece, in a line with the screws p and q, viz., one end of the cross piece p is in the same plane with the adjusting screw or stop q, and the other end in the same plane with the screw p, so that the cross piece p moves to the left and comes in contact with the screw q, and it moves to the right [and comes] in contact with screw r.

Having described the parts of this instrument, its movement is as follows:

If the current is made to pass through these helices in the proper direction, the needles move, and with them the arm and cross piece p, on the spindle S S S, will move so as to come in contact with the screw r. If the current is broken, then the cross piece, in obedience to the power of the spring n, will move reversely until it comes in contact with the screw q and is stopped, and as often as the circuit is closed, when the current is in a proper direction, the arm will move to the right, and when broken to the left. Figs. 5 and 6 represent two permanent steel magnets, D and C, made by three separate horse-shoe formed magnets, each seen in a top view [in] fig. 6, and a side view in fig. 6. In fig. 6 their north and south poles are marked N and S. The two magnets lie in the same horizontal plane with the south pole of one magnet near the north pole of the other magnet, but so far are these poles separated from each other as to admit an electro-magnet, E E, freely between them, and of sufficient power to effect the purposes designed and hereafter described. This electro-magnet, E E, is either a round or

square bar of soft iron, of the same material as that used in the construction of Morses's electro-magnets, and like Morse's electro-magnets surrounded by metallic insulated wire, as seen at K, fig. 5, and at K K, fig. 6. The two ends of the helix surrounding the soft iron keeper or armature, E E, are seen at a, b, fig. 6.

The electro-magnet is fastened to a vertical arm F, fig. 5, and the arm is hung upon a horizontal spindle or centre G, so as to allow the electro-magnet to oscillate or vibrate between the two permanent magnets D and G. From this same spindle or centre G, proceeds and is fast with the vertical arm F, another arm, K, called the pen lever, of the same kind as that used in Morse's instruments, and for the same purpose. Upon the extremity of this horizontal arm K, is its pen point T, for making indentations or marks upon the paper U and V, as is done by Morse's instruments.

There is no difference between Barnes and Zook's and Professor Morse's instrument, in reference to the pen lever, pen point, mode of moving the paper along, and the character of the marks upon the paper. Now, if the end of the wire b is put in the positive pole of a battery, and the wire a put in a negative pole, the effect is to produce electro-magnetism in the bar of soft iron E E′. E becomes the north pole, and E′ the south pole. Since like poles repel each other, and unlike attract each other, it follows that the electro-magnet E E′ will be attracted by the magnet D D, and recede from the magnet C C, fig. 6.

If the current is reversed through the helices K K, by reversing the poles a, b, or by any mechanical contrivance, another reverse battery is thrown in the circuit, while the first battery is thrown out, then the electro-magnet E E′ will be drawn to the magnet C C, and recede from the magnet D D.

To effect this change of current in the local circuit, two local batteries are used; Prof. Morse uses but one local battery. Figs. 3 and 4 represent the local batteries essentially like those used by Prof. Morse. By tracing the wires the proper connexion of these instruments will be understood.

The wire 11, fig. 4, from the positive pole of the local battery, is connected with the screw r at 15, fig. 2, and the wire 12 of the negative pole of the same battery is connected with the helix K, at 13 of fig. 5. The wire 10 of the negative pole of the local battery, fig. 3, is connected with the screw q at 14, and the wire 9 of the positive pole of the same battery with the helix K, at 13 of fig. 6. These two wires, from 9 and 12, both terminate in one wire, which is 13 of the helix K, of fig. 5. The other wire of the helix K, fig. 5, is connected with the foot I of the spindle of the receiver. Having described the parts of this plan, its mode of operation is as follows: Supposing the instrument to be receiving messages, a current is made to pass through the main line from the distant station, by closing the circuit at that end (there being a battery in the main circuit.) The current passes through the 8 helices (or more, if more are used) of the receiver, causing the needle to move

in the direction to carry the cross piece p, fig. 2, in contact with the screw r. This contact closes the circuit of the local battery, fig. 4, the circuit being as follows: from 11 to 15, and to the screw r from the screw to the cross piece p, along the arm to the spindle S, down the spindle to the foot I, and along the wire to 14, through the helix K, to 13; along the wire to 12, the negative pole of the local battery, fig. 4, and the soft iron E E′ becomes an electro-magnet. Then if the permanent magnets are, as shown in fig. 6, E, end of the electro-magnet becomes south, and E becomes north, and is attracted to the D magnet, which produces in the pen lever K an upward movement, and brings the pen point against the paper, passing under the roller R, and between the rollers R and S. If now the circuit is broken at the distant station, the arm piece p, by virtue of the spring n, is carried in contact with the screw g, fig. 2, and the local battery, fig. 3, is brought into action, reversing the magnetism in the electro-magnet E E′, and making the E end of the soft iron north, and E′ end south. Consequently the electro-magnet E E′ is attracted to the C C permanent magnet, which causes the pen lever K, and pen point T, to recede from the paper, passing under the roller R. This operation of the pen lever, and the point, and the marks upon the paper, are precisely what is produced by the operation of Morse's instruments.

In answer to the 20th interrogatory he says: It was called the "New Columbian Telegraph," and was said to be the invention of Barnes and Zook.

In answer to the 21st interrogatory he says: I have visited the office at Nashville of the defendants, and did so many times during the months of April, May, June, and July, 1848. The apparatus and machinery used there for telegraphing purposes was the same as that used at the Louisville office of said line, described in my answer to the 19th interrogatory, to which I refer for full answer to this 21st.

In answer to the 22d interrogatory he says: I was not present.

In answer to the 23d interrogatory he says: I am acquainted with it, and its mode of operation, and my answers to the previous interrogatories give the extent of my knowledge upon the subject, and the time and place of my acquiring the same.

In answer to the 24th interrogatory he says: I am. Have read all his patent papers, and have seen his invention in operation, as well as for three years operated it myself.

In answer to the 25th interrogatory he says: I refer to the specification and drawings attached to the letters patent of Prof. S. F. B. Morse, as containing as full and accurate a description of Morse's telegraph as I can give, and to my answer to the 19th interrogatory for my description of the telegraph of Baines and Zook.

In answer to the 26th interrogatory he says: After an examination of the drawing now exhibited, and upon which I have written my name and the date of this deposition, not having seen the instruments of Barnes & Zook as delineated in that drawing, but having with care examined and studied the said drawing, and become satisfied that I fully

understand the principles upon which it acts, I unhesitatingly express the opinion that the essential principles involved in the instrument of Barnes & Zook are the same as in those of Professor Morse.

In answer to the 27th interrogatory he says: They produce the same results upon the same principles, and not different.

In answer to the 28th interrogatory he says: The instruments of Barnes & Zook does not differ in principle from that of Prof. Morse.

In answer to the 29th interrogatory he says: The essential principles of Morse's instrument as patented are involved in that of Barnes & Zook. The reasons for my opinion that they are so involved are as follows: I have carefully examined the specifications and claims of Prof. S. F. B. Morse, as set forth in his patent, granted on the 20th day of April, 1840, reissued on the 15th day of January, 1846, and again reissued on the 13th day of June, 1848, for the "American Electro-magnetic Telegraph," and also his patent, granted on the 11th day of April, 1846, and reissued on the 13th day of June, 1848, for certain improvements thereon; I have compared the said "Columbian Telegraph" with the said "American Electro-magnetic Telegraph," for the purpose of ascertaining whether the former was in any respect an infringement of Morse's patent aforesaid.

Upon such full examination I am prepared to state, that the said apparatus as used in the said offices at Louisville, Kentucky, and Nashville, Tennessee, does infringe the patent rights of the said Morse for the "Electro-magnetic Telegraph," and the improvements thereon, in the respects following, to wit: First, in using the motive power of magnetism, when developed by the action of the galvanic current or current of electricity, substantially as set forth in the description of the first principal part of Morse's invention, contained in the specification of Morse's patent, as means of operating or giving motion to machinery to imprint signals upon paper or other suitable material, for the purpose of telegraphic communication. The mechanical arrangements in this part of the apparatus are identical as used in the American system of Morse and of the Columbian of Barnes & Zook, except that the "receiving magnet" of Morse is substituted by the "receiver" of Barnes & Zook, both of which, however, are equally operated upon or moved by the magnetism or motive power of the electric or galvanic current.

Second. In the employment of a register or recording instrument, corresponding in principle and effect with that employed by Morse, and substantially set forth in his specification aforesaid.

The trains of clock work to regulate the movement of the paper constituting a part of the register, are virtually the same in Morse's system and in Barnes and Zook. An electro-magnet constitutes an essential part of both instruments, and neither can be worked without it.

In Morse's it is stationary, and gives motion to the pen by attracting the armature affixed to one end of the pen lever.

In Barnes and Zook's it is moveable, being suspended to one end of the pen lever, and when magnetized is moved to and fro by the attraction and repulsion of its own poles, for and against the poles of the two fixed magnets between which it is suspended, carrying with it in

its vibrations one end of the pen lever. The result in both instruments is the movement of the pen, precisely alike and producing precisely the same effect.

In Morse's system the pen is withdrawn from the paper by a small spiral spring; in Barnes and Zook's a second local circuit is introduced for the same purpose. The magnetism of one circuit strikes the blow, and that of another withdraws the pen.

One of the fixed magnets is introduced for the purpose of giving more force to the blow, and the other to hasten the return of the pen to its former position; but both of them are powerless of themselves to move the pen or attract or repel the moveable electro-magnet until that is magnetized by the current upon the local circuits. The magnetism of this current is the power in both instruments, whatever may be the mechanical arrangements.

The fixed magnets of the register, as well as the needles of the receiver, have to be occasionally taken out and magnetized to maintain their character as fixed magnets, during which time and process the instruments are useless.

Third. In using the same combination of machinery constituting the "American Electro-magnetic Telegraph," as described by Morse in his specifications aforesaid, with no alterations in principle or in the modes of producing the results.

Fourth. In using the combination of two or more galvanic or electric circuits with independent batteries, for the purpose of obviating the diminished force of electro-magnetism in long circuits, and obtaining sufficient power to operate the register or recording machinery at any distance.

This is one of the vital principles of Morse's invention, and is the only means known by me by which sufficient magnetism or magnetic power can be obtained from the electric or galvanic current, to make, by means of a point, such as that of Morse's pen lever, a visible and distinct marking and indentation upon paper at a distance.

Fifth. The using the same system of signs, consisting of dots and spaces, and dots, spaces, and horizontal lines, described in the specification of Morse's patent aforesaid. I have seen the "Columbian Telegraph" aforesaid, in the Louisville and Nashville offices of the "People's line," so called, during the month of June, 1848, writing the letters of Morse's telegraphic alphabet, without alteration, in the combination of dots, spaces, and lines, making up the letters thereof; and am informed, and believe, that such was then the common practices in the offices on said line. And he is also informed, and believes, that the names of some of the letters are sometimes changed without any change in their component parts; and this change of names is called a different alphabet.

Sixth. In using the same system of signs, in combination with machinery for recording them; which machinery is described in the specifications aforesaid.

Seventh. In using a "receiving magnet," in the Barnes & Zook instrument, called a "receiver," being a device for breaking and clos-

ing the local or office circuits, in combination with such circuits as described in the specifications of Morse's patent, dated 11th April, 1846, and reissued on the 13th of June, 1848.

The combination referred to in said claim, though the same in principle, is different in mechanical arrangement from that referred to in Morse's original patents, and the reissues thereof aforesaid, in this respect only, viz:

The combination described in the latter is that of two or more circuits composing parts of one main line, each of which parts may be used for the double purpose of working a register and closing and breaking the next circuit in the series; whereas, the combination described in the former is composed of one circuit constituting the main line, and performing no other office than to close and break the local or office circuits to which the registers are attached; and these local or office circuits, constituting no part of the main line, perform no other office than to work the register.

The latter is the combination now in use on all the lines of Morse's telegraph, and is the same employed on the "People's line," so called, the "receiver" being considered a "receiving magnet," which takes its name from its office, and not from any peculiar form.

Eighth. In using the combination of the point or points of the pen and pen lever with the grooved roller, or other equivalent device, on which the paper passes, for the purpose of receiving the impression of the characters, and thus marking or printing by indentation.

In this respect, the Barnes & Zook instrument is an undisguised infringement of Morse's claim, the point and roller being used in the same combination and for the same purpose, and the marking being by indentation in precisely the same way.

Ninth. The Barnes & Zook instrument is a direct infringement of the essence of Morse's patent and invention, as defined in his specifications aforesaid, being the same application of the same power to the same end. The same form is used, the same result is produced, the same general process employed.

In answer to the thirtieth interrogatory he says: The slight difference in the mechanical arrangement of Barnes & Zook's instrument from that of Professor Morse's, does not constitute an improvement; on the contrary, I think the additional complication of machinery has a tendency to cause Barnes & Zook's arrangement of the same power to be less practicable and valuable than that of Prof. Morse.

In answer to the thirty-first interrogatory he says: In the registering instrument of Barnes & Zook, two permanent magnets are introduced to accomplish what, in Prof. Morse's, is accomplished by one electro-magnet and a spiral spring, while the electro-magnet is made to serve only to accomplish what is effected by the simple pen lever armature in Professor Morse's system; the difference being the moveable use of the electro-magnet in one without the use of the armature, and the introduction of the two permanent magnets, which are troublesome, and are dispensed with in Professor Morse's system.

In answer to the thirty-second interrogatory he says: They resem-

ble each other in their general appearance, and in all respects, excepting the introduction of the moveable for the stationary electro-magnet, and the introduction of the two permanent magnets, to accomplish what is accomplished by Professor Morse's system in a much more simple and reliable form.

In answer to the thirty-third interrogatory he says: The difference in the two consists, principally, in the introduction of a permanent magnet in the mutator to take the place of the armature in the receiving magnet, and the perforation of the helices of the electro-magnet to allow the arms of the circuit closer, and [the] breaker to play through them. The resemblance is the use of the electro-magnet to produce the motion necessary to break and close the local circuits, by giving motion to an upright shaft, similar to the one used in the receiving magnet of Professor Morse.

In answer to the thirty-fourth interrogatory he says: The object is to imprint telegraphic characters with the aid of electricity.

In answer to the thirty-fifth interrogatory he says: Telegraphic communication, by imprinting characters at a distance with the aid of electricity.

In answer to the thirty-sixth interrogatory he says: It is indispensible.

In answer to the thirty-seventh interrogatory he says: They are not.

In answer to the thirty-eighth interrogatory he says: The spring, as used in Morse's instruments, would be an equivalent for one of the permanent magnets, and a piece of soft iron an equivalent for the other.

In answer to the thirty-ninth interrogatory he says: They do, by substantially the same means.

In answer to the fortieth interrogatory he says: I consider it a disadvantage to have the magnet move instead of the armature.

In answer to the forty-first interrogatory he says: It is a fixed law and fact.

In answer to the forty-second interrogatory he says: I consider the multiplication of circuits superfluous, and the second a needless addition.

In answer to the forty-third interrogatory he says: The second circuit in the register is only equivalent to the spring.

In answer to the forty-fourth interrogatory he says: Yes. Attraction and repulsion.

In answer to the forty-fifth interrogatory he says: I think it would.

In answer to the forty-sixth interrogatory he says: The object in both is the same, and in Morse's arrangement there is no difficulty in obtaining double or twenty times the power necessary to mark.

In answer to the forty-seventh interrogatory he says: There is a disadvantage in the Columbian arrangement, owing to their inability to get as great power from their permanent magnets as can be obtained by the use of the electro-magnet as arranged in Morse's system. The ad-

vantage in Morse's is the ability to get requisite power, or double that without trouble.

In answer to the forty-eighth interrogatory he says: The permanent magnets are a less convenient and less practicable mode of applying the electro-magnetic power.

In answer to the forty-ninth interrogatory he says: Usually, by drawing it slo*y*ly over the face of the electro-magnet, powerfully charged, thereby inducing its magnetic qualities.

In answer to the fiftieth interrogatory he says: By the passage of a current of generated electricity over insulated wire around a bar of soft iron at right angles.

In answer to the fifty-first interrogatory he says: I consider the magnetic force of the steel and electro-magnet the same.

In answer to the fifty-second interrogatory he says: The decision of scientific men, collectively, I am not familiar with. My opinion is, that attraction and repulsion are both magnetic powers; one as much so as the other.

In answer to the fifty-third interrogatory he says: A power which gives motion to inanimate objects.

In answer to the fifty-fourth interrogatory he says: I think no motion would be produced in the piece of soft iron, for the reason that I believe the repulsive and attractive force the same.

In answer to the fifty-fifth interrogatory he says: I know no difference in the attractive and repulsive force of magnetism.

In answer to the fifty-sixth interrogatory he says: I conceive it impossible.

In answer to the fifty-seventh interrogatory he says: By the attractive force, and it gives sufficient force for all telegraphic purposes.

In answer to the fifty-eighth interrogatory he says: No complication of machinery is necessary, as it can be readily increased by the addition of cup or cups to the local battery. The introduction of the permanent magnet is wholly unnecessary.

In answer to the fifty-ninth interrogatory he says: Complication of machinery for increasing the power of a machine giving sufficient power is, in my opinion, a positive injury.

In answer to the sixtieth interrogatory he says: I know of nothing more material which would benefit the parties at issue in this cause, or either of them, that is material to the subject of this my examination *my examination* in the matters in question.

JAMES F. FOSS.

Sworn before me this 26th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

(Deposition of Charles T. Chester, taken under interrogatories copied herein on page 448, to wit:)

Deposition of Charles T. Chester.

Charles T. Chester, a witness produced and examined under and pursuant to commission and interrogatories hereunto annexed, on the part of the plaintiff in said commission and interrogatories named, in a certain cause, wherein Samuel F. B. Morse and others are complainants, and Henry O'Rielly and others are defendants. The said witness being first duly sworn on the holy evangelist of Almighty God, that the several answers that he should make to each and every of the said interrogatories to said commission annexed should be the truth, the whole truth, and nothing but the truth, did depose and say as follows:

In answer to the first interrogatory he says: I am aged twenty-two years; my profession is that of telegrapher; I reside in the village of Williamsburg in this State.

In answer to the second interrogatory he says: I am acquainted with the invention called Morse's Electro-magnetic Telegraph; I became acquainted with the same in the year A. D. 1846, assisting a friend in the preparation and equipment of his telegraph office at New Haven, in the State of Connecticut.

In answer to the third interrogatory he says: He proposed to communicate intelligence at a distance by imprinting signs at a distance from the writer by means of electro-magnetism.

In answer to the fourth interrogatory he says: He did, at his rooms on Nassau street, in the city of New York, in the year A. D. 1847.

In answer to the fifth interrogatory he says: He did, at the same time and placed referred to in my answer to the last interrogatory.

In answer to the sixth interrogatory he says: The drawing annexed to the letters patent of Professor Morse, under date April 11th, 1846, show fully and clearly, and acurately delineates the said apparatus and machine then exhibited to me and *and* seen in operation. The specifications annexed to said letters patent in connexionwith said drawing describes them as minutely and as accurately as it is possible for me to do, the operation of the said machine and the result produced by its operation.

In answer to the seventh interrogatory he says: He did not.

In answer to the eighth interrogatory he says: He proposed to employ but a single circuit.

In answer to the ninth interrogatory he says: My acquaintance with the invention commenced at the date referred to in my answer to the second interrogatory.

In answer to the tenth interrogatory he says: I have; the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the invention in such full, clear, and exact terms as would enable me to construct and use the same; I have no doubt I could construct one from them.

In answer to the eleventh interrogatory he says: In my opinion any person skilled in the art or science to which the said invention apper-

tains, or with which it is most nearly connected, would be enabled, from the specifications and drawings annexed to said letters patent, to construct and use said invention.

In answer to the twelfth interrogatory he says: I have; the said specifications and drawings referred to, and accompanying the same, do exhibit a description of the said patented improvement in such full and clear terms as would enable me to construct and use the same.

In answer to the thirteenth interrogatory he says: I think any such person would be.

In answer to the fourteenth interrogatory he says: It does show in what said improvement consists; it does distinguish what is new from what is old.

In answer to the fifteenth, sixteenth, seventeenth, eighteenth, nineteenth, twentieth, and twenty-first interrogatory he says: I have no knowledge, except by hearsay, of any of the matters in either of the interrogatories inquired about.

In answer to the twenty-second interrogatory he says: I was not.

In answer to the twenty-third interrogatory he says: I have no knowledge of that instrument, except that derived from a drawing referred to in my answer to the twenty-sixth interrogatory.

In answer to the twenty-fourth interrogatory he says: I am acquainted with said inventions; I have read his patent issued thirteenth of June, 1848, and I have seen his invention in operation.

In answer to the twenty-fifth interrogatory he says: The telegraph of Morse is accurately described in the specifications and drawings annexed to the letters patent referred to in the last interrogatory to which I would refer for a description thereof; that of Barnes and Zook is delineated in the drawing referred to in answer to the twenty-sixth interrogatory; I have heretofore prepared an accurate description of the various parts and functions of Morse's instrument, which was published in the American Journal of Science and Arts, by Professor Benjamin Silliman, B. Silliman, jr., and James D. Dana, in volume 5 of that work, published in 1848; I have annexed unto this my deposition a pamphlet, which contains a copy of said article and of said description thus published, and to which I refer as a part of my answer to this interrogatory. The said printed statement does fully and accurately delineate and describe Morse's instruments, with their various parts and functions.

I have signed my name at the top of the first page of said printed pamphlet, and also at the bottom of page 12 of said pamphlet, and placed opposite my name the date of the taking of this deposition.

In answer to the twenty-sixth interrogatory he says: After examining the drawing now exhibited, and upon which I have written my name and the date of this deposition, not having seen the original instrument, but having carefully studied the said drawing and satisfied myself of the principles upon which it acts, I have no doubt that the essential principles of the instruments of Barnes and Zook are the same as those of Morse's instruments.

In answer to the twenty-seventh interrogatory he says: The two

instruments produce the same and not different results, upon the same and not upon different principles.

In answer to the twenty-eighth interrogatory he says: There is no difference in the nature of Barnes & Zook's instruments from those of Morse. The essential principles of the two producing the same result, altho[ugh] there is a slight difference in the mechanical structure, but none which changes the nature and principles of Morse's instruments.

In answer to the twenty-ninth interrogatory he says: In my opinion I believe the essential principles of Morse's instruments, as patented, are involved in that of Barnes & Zook.

In answer to the thirtieth interrogatory he says: The slight difference in the structure of Barnes & Zook's instruments from that of Morse's, as patented, do not constitute any improvement.

In answer to the thirty-first interrogatory he says: The two instruments appear to differ in this: In Barnes & Zook's there is the substitution in the receiving magnet of a permanent fixed magnet for a moving armature, of the attachment of the magnet itself instead of the armature to the vibrating lever. In the register of the substitution of the two local circuits, two local batteries for one of either of an electro-magnet for the armature and the action of two permanent magnets, the one supplying the place of the spring in Morse's instrument. Also in the use of a lever bent at right angles for a straight one, or the attachment of the pen to a horizontally moving carriage. The result produced by both is the same, to wit, that of imprinting the pen upon the paper, and the withdrawal of the pen after the impression is made.

In answer to the thirty-second interrogatory he says: They appear to resemble each other in all other respects, except those stated in my answer to the thirty-first interrogatory.

In answer to the thirty-third interrogatory he says: This interrogatory is answered in my answer to the thirty-first and thirty-second interrogatories.

In answer to the thirty-fourth interrogatory he says: The object to be attained by the separate piece of apparatus in each instrument, the register, the mutator, and the receiving magnet, is to force the pen against the paper for the purpose of making an impression, and the withdrawal of the pen the instant the impression is made.

In answer to the thirty-fifth interrogatory he says: To produce the same result as that stated in my answer to the 34th interrogatory.

In answer to the 36th interrogatory he says: It is.

In answer to the 37th interrogatory he says: No, they are not.

In answer to the 38th interrogatory he says: It would, and a piece of soft iron would be an equivalent for the other.

In answer to the 39th interrogatory he says: They do accomplish the same results by substantially the same means.

In answer to the fortieth interrogatory he says: There is, in my opinion, a decided disadvantage. My reasons for this opinion are, that the motion of the magnet through the helices forbids the close ap-

proximation of the helix wire to the magnets, thus throwing away the action of some of the most powerfully magnetic inducing coils.

In answer to the forty-first interrogatory he says: It is.

In answer to the forty-second interrogatory he says: It is not better secured by multiplying the circuits, and the second is a needless addition.

In answer to the forty-third interrogatory he says: It is of no other use than to be an equivalent for the spring in the receiving magnet.

In answer to the forty-fourth interrogatory he says: There is attraction as well as repulsion.

In answer to the forty-fifth interrogatory he says: It would produce the same effects.

In answer to the forty-sixth interrogatory he says: It is to obtain power to mark. In Morse's there is no difficulty in obtaining more power than is wanted.

In answer to the forty-seventh interrogatory he says: There is a disadvantage, and no advantage.

In answer to the forty-eighth interrogatory he says: It is a less convenient mode of applying the electro-magnetic power.

In answer to the forty-ninth interrogatory he says: By the inductive action of the electric current, as in the soft iron electro-magnet, or by the influence of a powerful electro-magnet drawn slowly in contact with it towards its poles.

In answer to the fiftieth interrogatory he says: A piece of soft iron is made an electro-magnet by the inducing influence of an electric current passing at right angles thereto.

In answer to the fifty-first interrogatory he says: It is, in my opinion, and varies in permanency with the carbonization of the iron.

In answer to the fifty-second interrogatory he says: I cannot say how it is settled among scientific men; my own opinion is, that they are both magnetic powers, one as much so as the other.

In answer to the fifty-third interrogatory he says: It is that which changes "inertia" to "momentum."

In answer to the fifty-fourth interrogatory he says: No motion, if the soft iron were in equal proximity to each.

In answer to the fifty-fifth interrogatory he says: I do not know, and I do not remember to have seen or heard any attempt at its determination.

In answer to the fifty-sixth interrogatory he says: It is not.

In answer to the fifty-seventh interrogatory he says: By the attractive. It does give sufficient power for that purpose.

In answer to the fifty-eighth interrogatory he says: It could be thus obtained, and in a much more simple manner.

In answer to the fifty-ninth interrogatory he says: It is in my opinion a positive injury.

In answer to the sixtieth interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be a benefit to the parties at issue in this cause, or either of them, or that may be material

to the subject of this my examination, or the matters in question in this cause.

CHARLES T. CHESTER.

Sworn before me this 26th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

(Deposition of John Locke, taken under interrogatories copied herein on page 448, to wit:)

Deposition of John Locke.

John Locke, a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, the said witness having previously sworn, on the holy evangelists of Almighty God, that the several answers that he should make to each and every of the said interrogatories should be the truth, the whole truth, and nothing but the truth, did depose and say as follows:

In answer to the first interrogatory he says: I am aged 57 years; I am professor of chemistry in the medical college of Ohio, and reside at Cincinnati.

In answer to the second interrogatory he says: I am to some extent; I became acquainted with it by repute in 1837. I became actually acquainted with it in the year 1844.

In answer to the third interrogatory he says: It was by imprinting a sign at a distance; this I understood in 1837.

In answer to the fourth interrogatory he says: He did, at Washington, in the year 1844.

In answer to the fifth interrogatory he says: He did, at Washington, in the year 1844.

In answer to the sixth interrogatory he says: The machine I saw in operation was in all of its essential features the same as that described in the specifications and drawings annexed to his letters patent of 20th of June, 1840.

In answer to the seventh interrogatory he says: He never did, to my recollection.

In answer to the eighth interrogatory he says: He proposed to employ a single circuit, and no more.

In answer to the ninth interrogatory he says: I learned or heard of the invention of Professor Morse as early as 1837, and that he proposed to make permanent marks at a distance from the writer by means of the electro-magnet and a conducting circuit. I did not see the instrument in operation until 1844.

In answer to the tenth interrogatory he says: I read the letters patent some time since. I then formed the idea that they were sufficient to enable a person to construct and use the instrument. I have not read it recently.

In answer to the eleventh interrogatory he says: I have no doubt

that they would, nor have I any doubt that I could therefrom construct and use the same.

In answer to the twelfth interrogatory he says: I have read the letters patent of that date, and by the specifications and drawings therein contained I am of opinion that I could construct and use the invention.

In answer to the thirteenth interrogatory he says: In my opinion any person well skilled in the machinery of electro-magnetism could, from these specifications and drawings, construct and use the invention.

In answer to the fourteenth interrogatory he says: I believe the specification does clearly and sufficiently show in what the improvement consists, and distinguishes what is new from what is old. It certainly does so far as my knowledge extends.

In answer to the fifteenth interrogatory he says: Of this I know nothing, except that H. O'Rielly is constructing telegraph in that region.

In answer to the sixteenth interrogatory he says: Of this I know nothing.

In answer to the seventeenth interrogatory he says. Of this I know nothing.

In answer to the eighteenth interrogatory he says: Of this I know nothing.

In answer to the nineteenth interrogatory he says: Of this I know nothing.

In answer to the twentieth interrogatory he says: I know not.

In answer to the twenty-first interrogatory he says: I have not visited that office.

In answer to the 22d interrogatory he says: I was not present.

In answer to the twenty-third interrogatory he says: I was occasionally at the office or shop of Mr. Ware, in Cincinnati, while he was making the apparatus for Barnes and Zook, but after I learned it was considered a new invention, I avoided from motives of delicacy making myself specially acquainted with their instruments. The drawings of the instrument have since been shown to me, and I think I understand it.

In answer to the twenty-fourth interrogatory he says: I am acquainted with them, and I have read his patent of 1848, and I have seen it in operation.

In answer to the 25th interrogatory he says: From my answer to the 24th interrogatory, it will be seen that I have no answer to make to this question.

In answer to the 26th interrogatory he says: My answer to this question will be seen, in detail, in the several subsequent answers.

In answer to the 27th interrogatory he says: The essential and controlling instrument in each register, by which traces are made on the fillet at a distance, I believe to be the same, viz., the electro-magnet.

In answer to the 28th interrogatory he says: I do not wish to give a leading opinion.

In answer to the 29th interrogatory he says: Here, again, I beg to

be excused from giving, especially as any one may form an opinion from the facts which are stated in the following answers to more specific questions.

In answer to the 30th interrogatory he says: So far as I know anything of Barnes & Zook's machine, and so far as I can judge of it from these descriptions and drawings, I should not consider it an improvement.

In answer to the 31st interrogatory he says: The registering instrument of Morse consists of an electro-magnet, which, when excited by the closed circuit and current of electricity, draws the style or pen into the running fillet of paper, and makes either a dot or a line, according to the continuance of the closure. When the circuit is broken the magnetism ceases, and a spring retracts the pen and interrupts the marking. The electro-magnet produces this motion by attracting a piece of soft iron, called the "keeper;" this "keeper" becomes a magnet, for the time being, by the presence of the electro-magnet; it is then a mutual attraction between two magnets. Strictly and philosophically speaking, there is never any attraction between a magnet and a piece of unmagnetized iron; for, when a permanent steel magnet attracts, say an iron nail, that nail, as soon as it begins to be attracted, begins to be itself a magnet, and will attract still other nails. The action of Morse's register is therefore a mutual attraction between two magnets, which become magnetic at the moment they are desired to be so, viz., by the touch of the telegrapher's key, and again both lose their magnetism in an instant, when the key is let up and the circuit broken. In Barnes & Zook's machine the pressure of the pen is produced by the mutual attraction of an electro-magnet and a permanent steel magnet, aided also by a mutual repulsion of the repelling polarity of the electro-magnet and a permanent steel magnet. The retraction of the pen in their machine appears to be effected by reversing the current of electricity, and thus reversing the poles of the electro-magnet, which instantly moves in the reverse direction as far as the checks will permit. The reverse action is the equivalent of Morse's retracting spring. In both Morse's and Barnes and Zook's registers the object attained is the same, viz., the reciprocation or backward and forward motion of the pen so as to mark and not mark the paper. The only advantage possibly gained by Barnes & Zook is that of power, by availing themselves of auxiliary aid of repulsion. But, as they are obliged to move a heavier mass than in Morse's arrangement, it is doubtful whether the greater power, even if attained, would be more efficient. As Morse's machine gives a superabundance of power for marking the fillet, there appears to be no legitimate object in seeking for more. The use of the repulsion of the steel magnets endangers their own magnetism.

In answer to the 32d interrogatory he says: They resemble each other in having the mutual attraction of two magnets as their chief motive power, and in being both worked by the instrumentality of an electro-magnet, for this is the essential and distantly manageable part of both, being the part through which the distant telegrapher operates.

In answer to the 33d interrogatory he says: The receiving magnet is made with coils composed of a great length of very fine wire, and is thus adapted to being delicately acted upon by the electricity, necessarily modified by passing through long circuit of conductors. Its use is to close a "local" independent circuit all within the room of the distant or receiving office, and to bring the electricity of a local battery to act immediately on the included electro-magnet of the registering machine, thus undiminished by a long circuit, to act with sufficient force to indent or mark the paper, an office for which the receiving magnet itself would be too feeble. The "mutator" performs the same office of closing the short or local circuit, which it accomplishes by means of the first principle of electro-magnetism, discovered by Professor Oerstead in 1819. The principle is this: A current of electricity, say along a wire, tends to turn the pivoted magnetic needle of a contiguous compass at right angles to the same, in a determinate direction in reference to the direction of that current. Schweigger exalted this power by winding the conductor repeatedly round the needle, though a little distant from it longitudinally, in a hank-like form. This constitutes the "electro-magnetic multiplier" or common galvanometer.

The mutator consists of several magnetic needles, attached by their middle to a common vertical pivoted axis at right angles to it; each needle being surrounded at a free distance by the hank or skein-like coil of very fine wire, which wire is only a part of the common long circuit. It is therefore a galvanometer, adapted, by the great length of very fine wire, and by multiplication, to being moved by small currents of electricity, modified as it is by the long circuit through which it is compelled to travel. The mutator, then, performs the same office as the receiving magnet, not by means of an electro-magnet proper, but by means of another well known electro-magnetic instrument, the galvanometer. I see, by drawings and descriptions, that Barnes and Zook have more recently adopted what is called the axial magnet for their mutator. This consists of an electro-magnet in a coil too large to fit it, and acts by a tendency of the iron bolt to place its middle point coinciding with the middle point of the helix or coil. This is still closer allied to Morse's receiving magnet; indeed, it is a very slight modification.

In answer to the 34th interrogatory he says: I have anticipated this question in the answer immediately preceding this.

In answer to the 35th interrogatory he says: The object is in both cases the same.

In answer to the 36th interrogatory he says: It is.

In answer to the 37th interrogatory he says: They are not essential, as the end may be, and is, fully and perfectly attained without them.

In answer to the 38th interrogatory he says: They would be equivalent.

In answer to the 39th interrogatory he says: I have answered this question, except so far as a matter of opinion is concerned by the above statement of facts.

In answer to the 40th interrogatory he says: There is the disadvantage that it is necessarily more massive, and therefore requires more power to move it with the same quickness.

In answer to the 41st interrogatory he says: It is a law evident to common sense, as well as determined by study and experiment, that to produce a given velocity the force must be proportioned to the velocity to be moved; hence "a less weight is moved by a less force."

In answer to the 42d interrogatory he says: The double action of the mutator is not necessary in the receiving magnet, and yet the object is as perfectly attained.

In answer to the 43d interrogatory he says: The second circuit, or reverse action of the mutator, is merely the equivalent of the spring, accomplishing, as I understand it, nothing more than the retraction of the pen, as I have before stated.

In answer to the 44th interrogatory he says: There is.

In answer to the 45th interrogatory he says: The iron and the spring would produce the same effects of reciprocating the pen, yet I am unable to say in what degree. They actually do produce the same effects in the Morse register in a degree adequate to the purpose.

In answer to the 46th interrogatory he says: The object in both is to mark the paper; and in Morse's register with a magnet made by myself, each leg of which was only one inch long, and spool of wire one inch in diameter, excited by a single "groove" cup battery, having two square inches of platinum, I have obtained a power of more than five pounds on the pen, a power very much more than sufficient.

In answer to the 47th interrogatory he says: It seems to me that Morse accomplishes the same object quite as perfectly, and with means more simple and direct.

In answer to the 48th interrogatory he says: I should certainly prefer Morse's instrument.

In answer to the 49th interrogatory he says: The most common mode is by sliding the poles of it repeatedly over the reverse poles of another powerful magnet, either permanent or electro-magnetic, viz., the intended north pole of the one over the south pole of the other, an operation called "touching."

In answer to the 50th interrogatory he says: It is made so by enwrapping it with silk bound, or otherwise insulated copper wire, and passing the electricity of a galvanic or voltaic battery through that wire.

In answer to the 51st interrogatory he says: While they both continue magnetic, they are essentially the same.

In answer to the 52d interrogatory he says: They are both magnetic forces, and the only difference known to me is, that they operate in different or opposite directions.

In answer to the 53d interrogatory he says: I cannot define a word unless I see the sense in which it is used; I use the expression "motive power," to signify a power which produces motion; as water is the motive power of a mill, magnetism of Morse's register, pen, &c.

In answer to the 54th interrogatory he says: Ordinarily they would not, but as a nice question there are circumstances under which they would, though only a feeble effect.

In answer to the 55th interrogatory he says: The attractive; the attracting poles tend to increase each other's power, whilst the repelling have the reverse effect; and sometimes one repelling pole will overpower and destroy the other, or will reverse it, and make it an attracting one.

In answer to the 56th interrogatory he says: In the two machines in question, that with the attractive force alone is the most simple.

In the answer to the 58th interrogatory [he says:] The force is the attractive, and is quite sufficient.

In answer to the 57th interrogatory he says: The power of the local or registering magnet of Morse's can be increased to any extent, rather by increasing the size of the cups than by multiplying their number; and the power of the receiving magnet can be increased by multiplying the number of cups; means which I deem most simple, and easy of application.

In answer to the 59th interrogatory he says: All unnecessary combination of machinery beyond the full accomplishment of its function is not only absurd, but generally, if not always, injurious.

In answer to the 60th interrogatory he says: I do not know, and cannot set forth, any matter or thing which may [be] of benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

JOHN LOCKE.

Subscribed and sworn before me this 26th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of Mrs. Sarah Louisa Morse, taken under interrogatories copied herein on page 484, to wit:

Deposition of Mrs. Sarah L. Morse.

Mrs. Sarah Louisa Morse, a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, the said witness having personally sworn on the holy evangelist of Almighty God that the several answers that she should make to each and every of the said interrogatories should be the truth, the whole truth, and nothing but the truth, did despose and say as follows, to wit:

To the 1st interrogatory she says: I am 39 years of age, residing at No. 33, Bank street, in the city of New York, and I am the wife of Richard C. Morse, of said city, the brother of Samuel F. B. Morse.

In answer to the 2d interrogatory she says: I am, partially. My husband and myself resided in the house No. 270, East Broadway, in the

city of New York, in the year 1832. I well remember the arrival of my brother-in-law, Sam. F. B. Morse from France in the month of November, 1832, and that said S. F. B. Morse resided for several months at our house. I distinctly recollect that S. F. B. Morse was engaged, immediately after his coming to the house, in casting with lead or other metal certain pieces which he called type, and which I understood were to be used in some way, not then comprehended by me, for an electric or galvanic telegraph, which the said S. F. B. Morse had invented on board the ship during his passage home; that the said S. F. B. Morse melted the metal which he was using over the fire in the grate of my front parlor, and I distinctly recollect that, in his operation of casting, he accidentally spilled some of the metal upon the drugget or loose carpeting before the fire-place, and also upon a flag bottomed chair on which his mould was placed, and this drugget was seen for many years afterwards for various uses about the house. I distinctly remember having seen the mould used at that time by him for the purpose of casting said type.

In answer to the 3d interrogatory she says: By imprinting signs at a distance.

In answer to the 4th interrogatory she says: He did, in the fall of 1832, at my house, No. 270, East Broadway, in the city of New York, and it was then the subject of frequent conversations in the family.

In answer to the fifth interrogatory she says: He did shew me an apparatus or machine in operation in the year 1837, in the large room in the University of the city of New York.

In answer to the 6th interrogatory she says: I cannot do so.

In answer to the 7th interrogatory she says: He did not, to my knowledge.

In answer to the 8th interrogatory she says: I have no recollection upon that subject.

In answer to the 9th interrogatory she says: I know that, from Dec., 1832, to the year 1837, the mind and attention of Prof. Morse were occupied frequently in preparing and maturing his telegraph plans; that, as early as 1837 he had actually completed an instrument for that purpose, and had the same in operation in the large room in the University of the city of New York; that, from 1837 up to 1844, he was actually engaged in maturing his telegraphic operations; and that, as early as 1844, an experimental line was established between Baltimore and Washington, as I understood. It would be impossible for me to state more definitely all that was said or done by Prof. Morse, to my knowledge, in reference to his telegraph between November, 1832, and the year 1837, or at subsequent periods.

In answer to the 10th interrogatory she says: I have not.

In answer to the 11th interrogatory she says: I have not sufficient knowledge to say.

In answer to the 12th interrogatory she says: I have not.

In answer to the 13th and 14th interrogatories she says: I have not sufficient knowledge to answer these questions.

In answer to the 15th, 16th, 17th, 18th, 19th, and 20th, and 21st interrogatories she says: I have no knowledge of any of the matters inquired of in any of these interrogatories, or either of them, except by hearsay.

In answer to the 22d interrogatory she says: I was not.

In answer to the 23d interrogatory she says: I have no knowledge on this subject.

In answer to the 24th interrogatory she says: I am partially so, as herein above stated; I have not read the patent; I have seen the invention in operation as above stated.

In answer to the 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32d, 33d, 34th, 35th, 36th, 37th, 38th, 39th, [and] 40th interrogatories she says: I have no knowledge sufficient to enable me to answer these interrogatories.

In answer to the 41st interrogatory she says: I suppose it is.

In answer to the 42d, 43d, 44th, 45th, 46th, 47th, 48th 49th, 50th, 51st, 52d interrogatories she says: I have no knowledge sufficient to enable me to answer either of them.

In answer to the 53d interrogatory she says: That which moves.

In answer to the 54th, 55th, 56th, 57th, 58th, she says: I have no knowledge sufficient to enable me to answer either of them.

In answer to the 59th interrogatory she says: I should think it was.

In answer to the 60th interrogatory she says: I do not know, nor can I set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

SARAH L. MORSE.

Sworn before me, this 26th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of R. C. Morse.

(Deposition of Richard C. Morse, taken under the interrogatories copied herein on page 448, to wit:

Richard C. Morse, a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, the said witness having previously sworn on the holy evangelist of Almighty God, that the several answers that he should make to each and every of the said interrogatories should be the truth, the whole truth, and nothing but the truth, did depose and say as follows:

In answer to the 1st interrogatory he says: I am fifty-three years of age, reside in the city of New York, No. 33, Bank street, and [I am] one of the editors of the "New York Observer."

In answer to the 2d interrogatory he says: I am. Professor Morse is my eldest brother. On the 15th November, 1832, in company with

my brother Sydney E. Morse, I went to the North river, near the foot of Rector street, in the city of New York, where the packet ship Sully, Captain William Pell, had just moored on her arrival from Havre, having on board my brother, Samuel F. B. Morse, then returning home from a three years residence in Europe. Hardly had the usual greetings passed between us three brothers, and while on our way to my house, then No. 270, East Broadway, the said S. F. B. Morse informed us that he had made, during his voyage, an important invention which had occupied almost all his attention on ship-board, one that would astonish the world, and of the success of which he was perfectly sanguine. That his invention was a means of communicating intelligence by electricity, so that a message could be written down in a permanent manner by characters at a distance from the writer. That the said S. F. B. Morse took from his pocket, and showed us his sketch-book in which he had drawn the kind of characters which he proposed to use. These characters were dots and spaces representing the ten digits or numerals, and in the book were sketched other parts of his electro-magnetic machinery and apparatus theretofore actually drawn out in the sketch-book. The said sketch-book is now shown to me, and I recognise it from the drawings therein and other memoranda as the sketch-book then shown to me, and I have no doubt of its being the same. I have annexed the same to this my deposition, and have written upon the outside of the cover thereof my name and the date of this deposition. The drawings of the said machine and apparatus then contained in the said sketch-book, and to which I refer as the drawings of said machine and apparatus, I have marked as follows: The first leaf to which I refer is marked as follows, "page 25, A, Richard C. Morse." The second leaf to which I refer, I have marked "page 26, B, Richard C. Morse." The third leaf to which I refer, I have marked "page 27, C, Richard C. Morse." The fourth leaf to which I refer, I have marked "page 28, D, Richard C. Morse." The fifth leaf to which I refer, I have marked "page 29, E, Richard C. Morse." The sixth leaf to which I refer, I have marked "page 30, F, Richard C. Morse." In regard to the page 30, F, I would state, that the drawing upon that leaf, below two ink lines drawn across the same, marked AA, I have no recollection of seeing on the said leaf at the time the said sketch-book was shewn to me by my brother, as above stated in 1832. I distinctly recollect my surprise and delight at the announcement of this brilliant invention. The subject of this electric telegraph, which is the name by which my brother then called his invention, was daily conversed about in the family for weeks. That my brother, S. F. B. Morse, took up his residence for many weeks at my house, and as soon as he had removed his baggage from the ship Sully, he began the construction of his telegraph. He used a mould in which he cast the type for the characters or dots and spaces which he had invented, and which he had shewn to me in his sketch-book. This mould was of brass, sides and top, and a brass slide from the bottom upon which the numbers were stamped from 1 to 0, and

which could be easily adjusted so as to bring any desired number into the mould, that it might be cast upon the type to which it corresponded. These type were thin strips of type metal, about the thickness of a dollar, having cogs or teeth arranged in a particular manner. The mould was used by the said S. F. B. Morse at my house aforesaid previous to January, 1833. He melted his type metal at the front parlor grate of No. 270, East Broadway; that a considerable number of said type were cast of each of the numerals, and that one of my chairs and a piece of drugget before the grate were injured by the dropping of the melted lead upon them in the process of casting such type. I now have in my possession some of the said original type, as I verily believe, which were cast at the time above referred to, and which I recognise, as far as it is possible to recognise the same, to be the same type. I now have here and do produce some of said original type, which I have deposited in a small buckskin bag tied with a blue string, upon which bag I have written, "Richard C. Morse, April 26th, 1849," and which has been sealed in my presence with the private seal of the mayor of the city of New York, and which bag contains five pieces of type, numbered 0, 9, 6, 1, 2, and which bag is annexed to this my deposition, and I have no doubt that those are the original type cast at my house as above stated.

In answer to the 3d interrogatory he says: By imprinting signs at a distance.

In answer to the 4th interrogatory he says: My brother, S. F. B. Morse, conversed with me respecting a magnetic telegraph previous to 1837, but in that year he showed to me an apparatus, then in actual operation on a circuit of ten miles, which he exhibited to his friends in the mineralogical cabinet in the University of the city of New York.

In answer to the 5th interrogatory he says: This is answered by my answer to the 4th interrogatory.

In answer to the 6th interrogatory he says: I cannot do so without occupying more time than I have to devote to it.

In answer to the 7th interrogatory he says: He did, as early as the year 1832, propose to mark signs at a distance upon paper, by the decomposition upon paper of some saline or chemical preparation with which the paper was to be previously saturated, although at that time I could not perceive how it was possible to do so, without it was by burning the paper.

In answer to the 8th interrogatory he says: He proposed to employ but one circuit. In conversation between my two brothers, S. F. B. and Sydney E. Morse, on the subject of a telegraph, in the winter of 1832 and 1833, I distinctly recollect that a difference of opinion existed between us in regard to the number of the circuits necessary for a practical telegraph. In those conversations the said Samuel F. B. Morse contended, that to have more than a single circuit was not reducing the invention to its necessary and proper simplicity for practical purposes; that the said Sydney E. Morse contended for as many circuits as there were letters in the alphabet, and I remember that I took sides with

Sydney in the opinion, and I was at a loss to conceive why my brother Samuel F. B. Morse should lay so much stress, as he did, upon having a single circuit, unless it were to save expense, a motive which I deemed wholly unworthy of consideration, in view of the vast benefits to be secured by the invention.

In answer to the 9th interrogatory he says: I know that, from 1832 to 1837, my brother Samuel F. B. Morse was, from time to time, devoting his attention to completing the requisite telegraphic instruments and apparatus. That, as early as the year 1837, he had actually constructed and had in use an instrument and apparatus for that purpose, in the University of the city of New York, as above stated by me, and that, from that time forward, his time and attention were devoted to consummating and carrying out the permanent establishment of such telegraph, and that, as early as 1844, he had a line in operation between Washington and Baltimore. To state in detail all the information in my possession concerning the inception, progress, and completion of this telegraph, would occupy more time than I have to devote to it.

In answer to the 10th interrogatory he says: I have not read it.

In answer to the 11th interrogatory he says: I cannot state, as I have not read it.

In answer to the 12th interrogatory he says: I have not read it.

In answer to the 13th and 14th he says: I have not read it; I cannot state.

In answer to the interrogatories from the 15th to the 21st, both inclusive, he says: I have no knowledge of any of the matters inquired about in these interrogatories, except by hearsay.

In answer to the 22d interrogatory he says: I was not.

In answer to the 23d interrogatory he says: I am not.

In answer to the 24th interrogatory he says: I am, but have not read the letters patent; I have seen said invention in operation.

In answer to the 25th interrogatory he says: I cannot do so.

In answer to the interrogatories from the 26th to the 40th, both inclusive, he says: I have not knowledge sufficient to answer either of these interrogatories.

In answer to the 41st interrogatory he says: It is.

In answer to the interrogatories from the 42d to the 52d, both inclusive, he says: I have not knowledge sufficient to enable me to answer any of these interrogatories.

In answer to the 53d interrogatory he says: That which produces motion.

In answer to the 54th, 55th, 56th, 57th, and 58th interrogatories he says: I have not sufficient knowledge to answer these questions.

In answer to the 59th interrogatory he says: It is.

In answer to the 60th interrogatory he says: I do not know, nor can I set forth any other matter or thing which may be a benefit or advantage to the parties at issue in [said] cause, or either of them, or that

may be material to the subject of this *your* examination, or the matters in question in this cause.

RICHARD C. MORSE.

Sworn before me, this 26th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Deposition of Sydney E. Morse.

(Deposition of Sydney E. Morse, taken under the interrogatories copied herein on page 448, to wit:)

Sydney E. Morse, a witness, produced and examined under, and pursuant to, the commission and interrogatories hereunto annexed, the said witness having previously sworn on the holy evangelist of Almighty God that the several answers that he should make to each and every of the said interrogatories, should be the truth, the whole truth, and nothing but the truth, did depose and say as follows:

In answer to the 1st interrogatory he says: I am 55 years old, editor of the New York Observer, and reside in the city of New York.

In answer to the 2d interrogatory he says: I am; I became so acquainted with it as early as November, 1832, on the arrival of my brother, Samuel F. B. Morse, on board of the packet ship Sully. Immediately after he left the said ship, in company with myself and my brother Richard C. Morse, he communicated to us the fact that he had invented an electric telegraph, by which he could write signs at a distance.

In answer to the 3d interrogatory he says: By imprinting the signs at a distance from the writer.

In answer to the 4th interrogatory he says: He did, in November, 1832, at the residence of my brother, Richard C. Morse, and in other places in the city of New York.

In answer to the 5th interrogatory he says: Yes; in the long room of the university in the city of New York, in the summer or fall of 1837.

In answer to the 6th interrogatory he says: I have no drawing of said apparatus, but remember that the result of the operation of the machine was the making of dots and dashes upon paper.

In answer to the 7th interrogatory he says: I think he suggested that the paper might be perforated by the electrical spark.

In answer to the 8th interrogatory he says: A single circuit, and only one.

In answer to the 9th interrogatory he says: That, from 1832 up to 1837, I understood that my brother was engaged in maturing his telegraph, and as early as September, 1837, he had a machine in operation at the university in the city of New York. I was the author of an article in the "New York Observer," dated April 15th, 1837, which article is headed "Newly invented Telegraph."

That article was as follows:

Newly invented telegraph. We take the following from a Washington letter in the Baltimore patriot: M. Gonon and his associate, M. Servell, have, after many years application to the subject, invented an important system of telegraphs, which casts into the shade every thing of the same kind that has yet been attempted. By their admirable plan they can communicate every kind of information, word by word, and punctuate the same, without using more signals than words, and with as much rapidity as a person can write, or even speak. They have received the most flattering encouragement from those literary and scientific gentlemen to whom they have explained the system, and not a doubt is entertained that it will accomplish the purpose of the inventors. M. Gonon assures me that he will be able to communicate a dispatch of one hundred words from New York to New Orleans in half an hour, and those who are thoroughly acquainted with the system confirm his promises. How elementary does every other system appear in comparison of that which can accomplish such an object. The imagination is overpowered in contemplating the consequences of such an achievement of human ingenuity. Distance is annihilated. Thousands of miles no longer divide us. We know on the instant as it were the actions, the wishes, the determinations of our fellow beings of other States. Fortunate it is that we live in an age for whose intellectual progress nothing is too ripe."

We know nothing of the telegraph of Messrs. Gonon and Servell except what is related in the above paragraph; but we do know that a gentleman of our acquaintance several years since suggested that intelligence might be communicated almost instantaneously hundreds, if not thousands, of miles by means of very fine wires properly coated to protect them from moisture, and extending between places thus widely separated. It is well known that the electric fluid occupies no perceptible time in passing many miles on a wire; and, if it is possible, by connecting one end of the wire with an electrical or galvanic battery, to produce any sensible effect whatever at the other, it is obvious that, if there are twenty-four wires, each representing a letter of the alphabet, they may be connected with the battery successfully in any order. And if so connected, in the order of any of the letters of any word or sentence, that word or sentence could be read or written by a person standing at the other end of the wires. All the letters of a paragraph in a newspaper could thus be touched successively by a man in Philadelphia, and the contents, verbatim et literatim, be conveyed to New York as fast as a compositor could set up the type. It is not impossible that the time may be near when speeches in Congress, taken by reporters and conveyed by these "electric telegraphs" to New York or New Orleans, may be in type, printed, circulated, and read, within a few hours after the voice of the speaker has ceased at Washington. The wires necessary for a distance of a hundred miles need not weigh many pounds, and if enclosed in an India rubber tube, and supported on high poles, erected along the route at intervals of 4 or 500 feet, could be extended through an immense distance at a trifling expense.

The feasibility of the project depends entirely upon the practicability of producing any sensible effect at one end of a long wire by connecting the other end with an electrical or galvanic battery.

By the words "gentleman of our acquaintance," used in that article, I intended my brother Sam. F. B. Morse, then of New York, now a resident of Poughkeepsie, in the State of New York. Although I gave a general plan of a telegraph of "24 wires, each representing a letter of the alphabet," this was my own idea, not my brother's, for I was well acquainted at the time with his plan of using but a single circuit of wire, and of using a conventional system of signs, composed of dots and spaces for numerals. That my brother communicated to me his plan of an electrical telegraph in November, 1832, while I was walking with him from the ship Sully, (in which he had just arrived from Havre, and which was then lying at Rector street wharf, in the city of New York, to the house of my brother, Richard C. Morse, in the eastern part of the city, where my brother, the said Samuel F. B. Morse, remained for some time after his arrival. He was full of the subject of the telegraph during the walk from the ship, and for some days afterwards could scarcely speak about any thing else. He expressed himself as anxious to make apparatus and try experiments, for which he had had no materials or facilities on ship-board.

In the course of a few days after his arrival he made a kind of cogged or saw tooth type, the object of which, I understood, was to regulate the interruptions of the electrical current so as to enable him to make dots, and regulate the length of marks or spaces on the paper upon which the information transmitted by his telegraph was to be recorded. One mode of making the dots or marks I understood was to be by employing the electrical current to decompose some chemical material previously spread upon the paper. He proposed at that time a single circuit of wire, and only a single circuit, and letters, words, and phrases, were to be indicated by numerals, and these numerals were to be indicated by dots, or other marks and spaces, on paper. It seemed to me that as wire was cheap it would be better to have 24 wires, each wire representing a letter of the alphabet, but my brother always insisted on the superior advantages of his single circuit. From the time he communicated to me his plan of electrical telegraph, in November, 1832, I was deeply impressed with the feasibility and vast importance of this mode of transmitting information, and often made it the subject of conversation with my friends; but as the whole matter of electric telegraphs was then entirely new, I generally spoke of an electric telegraph of 24 wires, because it was easy to make any body comprehend the operation of such a telegraph, while it required some effort of imagination to comprehend the operation of my brother's; and because, too, as I have already stated, I thought there were important advantages, constituting, on the whole, a superiority in the use of 24 wires. In this last opinion I was always opposed by my brother, the inventor of the telegraph, whose plan from the beginning was only a simple circuit.

The article published by me in the N. York Observer, in April, 1837, and which is above set out, was written and published antecedent to the time in that year when I saw my brother's instrument in operation at the University buildings, as above stated by me. It was written without any previous consultation with him, and without his knowledge. My business engagements at that time were very numerous and pressing, and my interviews with my brother, Sam. F. B. Morse, for some time previous thereto had been only occasional and casual, and I had not for several months previous thereto had much previous conversation with him in reference to the progress he had made in putting his invention into practical use, although I knew that he was actually engaged in preparing an instrument of that kind. On recurring to that article I perceive that I made use of the word "suggested;" the word itself does not perhaps convey the precise idea as fully and clearly as I intended at the time to convey; for the fact is, as above stated by me, that my brother S. F. B. Morse, as early as 1832, had not only actually invented said electric telegraph, but had actually described to me the mode and the means by which he would be enabled to print characters at a distance from the writer.

In answer to the 10th interrogatory he says: I have not, and as I have not, I cannot state.

In answer to the 11th interrogatory he says. As I have not read it I cannot answer.

In answer to the 12th interrogatory he says: I have not read it, and therefore cannot state.

In answer to the 13th and 14th interrogatories he says: For the reasons above stated I cannot answer.

In answer to the interrogatories from the 15th to 21st, both inclusive, he says: I know nothing, except by hearsay, in reference to the matters inquired of in these interrogatories or either of them.

In answer to the 22d interrogatory he says: I was not.

In answer to the 23d interrogatory he says: I am not.

In answer to the 24th: I am as above stated. I have not read the letters patent, but I have seen the said invention in operation.

In answer to the 25th interrogatory he says: I cannot describe them.

In answer to the interrogatories from the 26th to the 40th, both inclusive, he says: I have not sufficient knowledge to answer either of the said interrogatories, or either of them.

In anwer to the 41st interrogatory he says: It is.

In answer to the interrogatories from the 42d to the 52d, both inclusive, he says: I do not profess to have sufficient knowledge to answer either of these interrogatories.

In answer to the 53d interrogatory he says: Any thing which causes motion.

In answer to the 54th, 55th, 56th, 57th, and 58th interrogatories he says: I have not sufficient information to answer either of these interrogatories.

In answer to the 59th interrogatory he says: It is; for the more simple the machinery is the better, if it will accomplish the desired end.

In answer to the 60th interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

SIDNEY E. MORSE.

Sworn before me this 26th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

(Deposition of James C. Bliss, taken under the interrogatories copied herein on page 448, to wit :)

Deposition of J. C. Bliss.

James C. Bliss, M. D., a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, the said witness having previously sworn on the holy evangelist of Almighty God that the several answers that he should make to each and every of the said interrogatories should be the truth, the whole truth, and nothing but the truth, did depose and say as follows:

In answer to the 1st interrogatory he says: I am 58 years of age, by profession a physician, and reside in the city of New York.

In answer to the 2d interrogatory he says: I am somewhat acquainted, but not minutely, with Morse's Electro-magnetic Telegraph. I was first made acquainted with the projected telegraph in December, 1832, by several conversations I had with Professor Morse while attending him professionally at his brother's residence in East Broadway, in the city of New York.

In answer to the 3d interrogatory he says: From the conversations I had with him, and from his being engaged at the time referred to in preparing metallic types, I supposed it was by impressing the sign at a distance. I have a distinct recollection of his having been engaged in casting types, from his having burned his fingers in the process.

In answer to the 4th interrogatory he says: Professor Morse did not describe to me any apparatus or parts of apparatus. His projected apparatus was at this time not matured, and he was merely engaged in preparing it, and had, I believe, at this time never put it in operation. I recollect different articles in his room, but they were not put together so as to form a machine or apparatus.

In answer to the 5th interrogatory he says: He never showed me any apparatus.

In answer to the 6th interrogatory he says: I cannot do so.

In answer to the 7th interrogatory he says: He never did, to my knowledge.

In answer to the 8th interrogatory he says: I have no knowledge upon that subject.

In answer to the 9th interrogatory he says: The knowledge I had of the electro-magnetic telegraph was from conversations with Professor Morse after its inception, as it occurred immediately after his return from Europe. I may have had some little conversation with him on the subject subsequently, but of this I have no particular recollection. I know he was engaged in maturing the thing for several years, while at the same time he was engaged to some extent in his professional pursuits.

In answer to the 10th, 11th, 12th, 13th, and 14th, interrogatories he says: I have not read the letters patent, and therefore cannot answer either of them.

In answer to the interrogatories from the 15th to the 21st, both inclusive, he says: I have no knowledge of the matters inquired about in these interrogatories, or either of them.

In answer to the 22d interrogatory he says: I was not.

In answer to the 23d interrogatory he says: I am not.

In answer to the 24th interrogatory he says: No further than as above stated. I have not read his letters patent, nor have I seen his invention in operation.

In answer to the interrogatories from the 25th to the 40th, both inclusive, he says: I know nothing.

In answer to the 41st interrogatory he says: It is.

In answer to the interrogatories from the 42d to the 51st, both inclusive, he says: I have no knowledge of the subject matters inquired about in these interrogatories, or either of them.

In answer to the 52d interrogatory he says: I suppose it is not settled, but I believe both are magnetic powers; one as much so as the other.

In answer to the 53d interrogatory he says: That which produces motion.

In answer to the 54th interrogatory he says: They would not produce any motion.

In answer to the 55th interrogatory he says: I cannot say which is.

In answer to the 56th interrogatory he says: It is not possible.

In answer to the 57th interrogatory he says: I do not know.

In answer to the 58th interrogatory he says: I have not sufficient knowledge to answer.

In answer to the 59th interrogatory he says: It is.

In answer to the 60th interrogatory he says: I think I was probably the first person to whom Professor Morse communicated the fact of his having discovered the electric telegraph after his arrival from Europe in 1832, with the exception of his brothers, Sidney E. and Richard C. Morse. I believe this to be the fact, from the circumstance that upon recurring to my books I have ascertained the precise period of my attendance upon Professor Morse at his brother's house to have been from the 4th to the 13th days of December, 1832, both inclusive. Professor Morse was then confined to his room at his brother's house, with a cutaneous affection, which prevented him from walking out. It was

in those visits he communicated the fact of his having discovered the above invention. I do not know, nor can I set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

JAS. C. BLISS.

Sworn before me this 27th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

(Deposition of Wm. W. Pell, taken under the interrogatories copied herein on page 448, to wit:)

Deposition of Wm. W. Pell.

William W. Pell, a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, the said witness having previously sworn on the holy evangelist of Almighty God that the several answers that he should make to each and every of the said interrogatories should be the truth, the whole truth, and nothing but the truth, did depose and say as follows:

In answer to the 1st interrogatory he says: I am *aged* 48 years of age; reside at Hackensack, New Jersey, and am a mariner by profession.

In answer to the 2d interrogatory he says: I am. I became acquainted with it under the following circumstances: In the month of October, 1832, Professor S. F. B. Morse made a passage from Havre to New York, on board of the packet ship Sully, of which I was then the commander. After many days of the passage had passed, he first made mention, in the presence of myself and others, seated with him at the breakfast table, of the idea of an electric telegraph, as having occurred to his mind during the passage, and he entered into some explanation of the means by which he thought such an instrument could be realized; that throughout the subsequent portion of the passage his mind was busied in bringing it to maturity; and all his improvements upon it, from its first vague form, through all its progressing grades of perfection, much to its present condition, were, as he successively reached them, named in the presence of myself and others, until he had presented to our minds, before the passage ended, his instrument, essentially the same as his present one, and as the one I saw in operation at the university shortly after that voyage, both in its principles and mechanism, its numeral dots i ï 2 3̈ and its typal forms

&c., most of which are still fresh in my recollection as he explained them; as are also the words he addressed to me a few days before leaving the ship: "Well, captain, should you hear of the telegraph one of these days as the wonder of the world, remember the discovery was made on board the good ship Sully."

In answer to the 3d interrogatory he says: By imprinting signs at a distance.

In answer to the 4th interrogatory he says: He did, on board the ship Sully. At that time he spoke of a galvanic trough, the circuit from which was broken and closed by means of a lever, acted upon by toothed types, moved by a crank; at the other extremity of the circuit was an artificial horse-shoe magnet, with a moveable armature, holding a pencil or pen, and carrying it by the movement communicated from the closing and breaking of the circuit over a papered cylinder, on which it traced a succession of toothed marks. This was in the month of October, 1832. On that passage Professor Morse also showed to me a sketch book, in which were contained drawings of some of said telegraphic apparatus. The said sketch book, now shewn to me, I recognise as being the same sketch book then in the possession of Professor Morse; I have written on the outside of said sketch book my name and the date of the taking of this deposition. I now distinctly recollect that the said sketch book, at the time I saw it on board of the packet ship Sully, had, in the drawings on the leaf now marked by me as page 14, A A, and upon which leaf I have written my name and the date of this deposition. I also distinctly recollect that, at the time I saw the said sketch book, it had on it the drawings on the leaf of the said book, marked page 28, D, and on which is the name of Richard C. Morse, and upon which page I have written my name and the date of this deposition. The drawing contained on the said last named leaf is a drawing of the part of the apparatus and machinery described by Professor Morse, and to which I have referred above. I also recollect that there was in said book various other drawings.

In answer to the 5th interrogatory he says: He did show me an apparatus and machine in operation at the University of the city of New York; which instrument, the moment I saw it, I recognised as being constructed upon the same general principles of the telegraphic instrument described by Professor Morse on board the ship Sully, on his passage from Havre, in 1832. The precise time I saw said instrument in operation I do not recollect.

In answer to the 6th interrogatory he says: I cannot do this more fully than I have done.

In answer to the 7th interrogatory he says: I have no recollection that he did.

In answer to the 8th interrogatory he says: A single circuit.

In answer to the 9th interrogatory he says: I do not know that I can state any thing more particularly than I have done.

In answer to the 10th, 11, 12, 13 and 14th interrogatories he says: I have not read the letters patent, and therefore cannot answer these interrogatories.

In answer to the interrogatories from the 15th to the 21st, both inclusive, he says: I have no knowledge, except by hearsay.

In answer to the 22d interrogatory he says: I was not.

In answer to the 23d interrogatory he says: I am not.

In answer to the 24th interrogatory he says: I am, as above stated;

I have not read the letters patent; I have seen the invention in operation.

In answer to the interrogatories from the 25th to the 40th, both inclusive, he says: I have no knowledge that will enable me to answer either of the above interrogatories.

In answer to the 41st interrogatory he says: It is.

In answer to the interrogatories from the 42d to the 52d, both inclusive, he says: I have not knowledge to enable me to answer either of the above.

In answer to the 53d interrogatory he says: That which produces motion.

In answer to the 54th interrogatory he says: It would not.

In answer to the 55th interrogatory he says: If there is any difference, I should think the attraction had the most.

In answer to the 56th interrogatory he says: I suppose it is not.

In answer to the 57th interrogatory he says: I do not know as to that, but I know that Morse's gives sufficient power to make sounds or signs for telegraphic purposes.

In answer to the 58th interrogatory he says: I cannot answer.

In answer to the 59th interrogatory he says: Undoubtedly it is.

In answer to the 60th interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them; or that may be material to the subject of this my examination, or the matters in question in this cause.

WM. W. PELL.

Sworn before me this 27th day of April, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

I certify that the bag hereunto annexed is sealed with my private seal, and was so sealed in my presence, on the examination of Richard C. Morse, this day; and that the same is referred in said Morse's deposition, and that the type deposited in said bag are the same produced before me by said Morse on his examination under the commission hereunto annexed, and are the same type and bag referred to in said deposition of Richard C. Morse.

Dated April 26, 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

STATE OF NEW YORK,
City and county of New York, ss.

I, Wm. F. Havemeyer, mayor of the city of New York, and chief magistrate of the said city, do hereby certify, that the preceding depositions were taken by me under and pursuant to the annexed commission, and the interrogatories thereunto annexed. That the said wit-

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nesses were, each of them, first duly sworn by me on the holy evangelist of Almighty God, that the answers that they should respectively make should be the truth, the whole truth, and nothing but the truth. That said depositions were taken at the mayor's office in said city, and each of the said depositions were either reduced to writing by me, or by said witnesses respectively in my presence; and the same, in my presence, were subscribed by them respectively, at the respective dates stated in the jurat affixed by me at the foot of said depositions respectively, after the same had been carefully read over to said witnesses; and that the several exhibits hereunto annexed were exhibited before me, and as such were marked by me.

In witness whereof I have hereunto set my hand and affixed the [L. S.] seal of the mayoralty of the city of New York, this 27th day of April 1849.

W. F. HAVEMEYER,
Mayor of the city of New York.

Interrogatories.

(Interrogatories, to wit:)

Interrogatories to be propounded to witnesses on the part of the complainants.

1. What is your age, profession, and residence?
2. Are you acquainted with the invention called Morse's Electro-magnetic Telegraph? If yea, state when, where, and under what circumstances you became acquainted with it.
3. How did Professor S. F. B. Morse propose to communicate intelligence at a distance? Was it by an evanescent sign, or by imprinting the sign at a distance?
4. Did or not Professor Morse describe to you any apparatus, or parts of apparatus, of a telegraph? If yea, when and where did he do so?
6. Did or not he ever show to you any apparatus or machine in operation; and if yea, when and where did he do so?
6. Please exhibit and annex to your deposition a drawing or drawings delineating the said apparatus or machine so shown to you, and describe the operation of the said machine.
7. Did or not Professor Morse, to your knowledge, ever have or propose any other mode of making signs at a distance; and if yea, what was that method, and when did he propose it?
8. Did he employ, or propose to employ, a single circuit or conductor, or more than one?
9. State whatever else you may know respecting the invention by Professor S. F. B. Morse, of the electro-magnetic telegraph, the dates, and all the particulars in relation to its inception, progress, and completion.
10. Have you read the letters patent of the U. States, issued to S. F. B. Morse on the 13th June, 1848, for a new and useful improvement in the mode of communicating information by signs, by the applica-

tion of electro-magnetism, (being a second reissue of the patent issued to said Morse originally, on the 20th day of June, 1840,) together with the specifications thereto annexed? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the invention in such full, clear, and exact terms, as would enable you [to] construct and use the same.

11. State whether or not, in your opinion, any person skilled in the art or science to which the said invention appertains, or with which it is most nearly connected, would be enabled, from the specification and drawings annexed to the said letters patent, to construct and use said invention.

12. Have you read the letters patent, issued to S. F. B. Morse on the 13th June, 1848, for an improvement in electro-magnetic telegraphs, being a reissue of a patent issued to said Morse on the 11th April, 1846, with the specifications annexed thereto? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the said patented improvement in such full and clear terms as would enable you to construct and use the same.

13. State whether or not, in your opinion, any person skilled in the art or science to which said patented improvement is most nearly connected, would be enabled, from said last named specifications and drawings, to construct and use the said improvement.

14. State whether or not, in your opinion, the said last named specification does clearly and sufficiently show in what said improvement consists, and distinguish what is new from what is old.

15. State what you may know respecting the erection of a line of telegraph by the defendant, H. O'Rielly, and those employed by him from Louisville, Kentucky, to Nashville, Tennessee; when the same was built, what is the nature of said line, and what it was commonly called.

16. State in like manner what you may know respecting the building of a line of telegraph between the same points by or for the complainants; when it was done, and the nature of the same; when it was put in operation, and whether it has continued to operate.

17. State what you may know respecting the mode in which the defendants put and kept their said line in operation, and all the circumstances attending the same.

18. State the situation of the terminus and office of the defendants' said line in Louisville, and when and whether you visited the same.

19. Describe the apparatus and machinery you observed in the said office, and annex a drawing or drawings of the same, and explain as fully as you can the mode of its operation.

20. What was the said apparatus called, and whose invention was it said to be?

21. Have you at any time, and when, visited the office at the Nashville end of the line of the defendants? And if yea, describe the appa-

ratus and machinery used in the said office for telegraphing as fully and clearly as you can, together with its mode of operation.

22. Were you present at the hearing before his honor the district judge of Kentucky, in August and September, 1848, of the motion for an injunction in this case? If yea, state whether any instrument for telegraphing was exhibited on the part of the defendants. And if yea, what was it called, and in what, if in any respect, did it differ from the instrument in the office of the defendants at Louisville?

23. Are you acquainted with the instrument called Barnes & Zook's telegraph, said to be invented by Barnes & Zook, and its mode of operation? If yea, state the extent of your knowledge upon this subject, and when, where, and how you acquired the same.

24. Are you acquainted with the inventions patented to S. F. B. Morse by the United States? Have you read his patents issued on the 13th June, 1848; and have you seen his said invention in operation?

25. Describe the telegraph of Morse, and that of Barnes & Zook, embracing the whole of each machine with all its parts, from the main battery to the register, describing the functions of each part; and annex to your answers such drawings of both the instruments as may be useful to explain them and facilitate the understanding of your answers.

26. Examine the drawings now exhibited to you, marked "drawings of Barnes & Zook's Telegraph," with the explanatory notes, and having written your name, and the date of taking this deposition thereon, please to state upon such examination, or upon your knowledge of the instrument itself from having seen the same, (naming which,) whether or not, in your opinion, the essential principles of the instrument of Barnes & Zook are the same as those of Morse's instrument.

27. Do the two instruments produce the same or different results, upon the same or different principles?

28. If the instrument of Barnes & Zook differs in your opinion from that of Morse, what is the nature of these differences, and do they affect the essential principles of the two?

29. State whether, in your opinion, the essential principles of Morse's instrument as patented is or is not involved in that of Barnes & Zook.

30. If, in your opinion, the instrument of Barnes & Zook differs from that [of] Morse as patented, do those differences in your opinion constitute any improvement?

31. State in what the two registering instruments appear to differ.

32. State in what do they appear to resemble each other.

33. State in what the two instruments, called the mutator and the receiving magnet, appear to differ, and in what they resemble each other.

34. What is the object to be attained by the separate pieces of apparatus in each instrument—the register, the mutator, and the receiving magnet?

35. What is the object to be attained by the combination of the two parts of the apparatus in each, to wit, by the combination of the reg-

ister and the receiving magnet in the one case, and the register and mutator in the other?

36. Is the power of electro-magnetism in the two instruments essential to put either of them in operation?

37. Are the permanent magnets in the Columbian essential to the ultimate end to be attained by both instruments, to wit, the marking of characters at a distance?

38. Would a spring be a mechanical equivalent for one of the permanent magnets, and a piece of soft iron an equivalent for the other?

39. Does the mutator and the receiving magnet accomplish the same result by substantially the same means?

40. Is there an advantage or a disadvantage in having the magnet move instead of the armature, in the mutator and register of the Columbian?

41. Is it or not a well established law of mechanics that a less weight is moved with less force than a greater?

42. The mutator breaks and closes two local or "resident" circuits, while the receiving magnet breaks and closes but one; is the same end which is attained by each better secured by multiplying the circuits, or is the second a needless addition?

43. By Morse's receiving magnet, when a single local circuit is closed an electro-magnet is produced in that local circuit, which directly marks by attracting an armature placed near the poles of the magnet. When the circuit is broken and the magnetic attraction ceases, a spring returns the armature to its normal position. Is the second circuit of the mutator of any other use than to be an equivalent of the spring in the receiving magnet?

44. In the action of the electro-magnet with the permanent magnets in the Columbian, is there not attraction as well as repulsion?

45. Would or not a piece of unmagnetic iron placed in the position of one of the permanent magnets, and a spring substituted for the other permanent magnet, produce the same effects of attraction and repulsion, though it may be in less degree?

46. Is or not the object of both arrangements of electro-magnets in the two instruments the same, to wit, to obtain power to mark; and in Morse's arrangements is there any difficulty in obtaining more power than is necessary to accomplish that object?

47. Is there any advantage in this respect in the Columbian arrangement over the arrangement in Morse's; is there any disadvantage?

48. Is the contrivance of the permanent magnets any thing else than a less convenient mode of applying the electro-magnetic power?

49. How is the permanent magnet, often called the steel magnet, made magnetic?

50. How is the electro-magnet made magnetic?

51. Is or is not the magnetic power or force of the steel magnet and of the electro-magnet essentially the same; if not, at what point, having regard to the density of the metal magnetized, does electro-magnetism cease and permanent magnetism commence?

52. Is it settled among scientific men whether the attraction and repulsion of magnets are different forces, or powers of the same force operating in different directions; are or are not both magnetic powers, and one as much so as the other?

53. What is meant among scientific men by the terms "a motive power?"

54. If the opposite poles of two permanent magnets of the horse-shoe form, having the same attractive and repulsive force, be placed near each other, and a piece of magnetized soft iron be suspended between them, will they produce any motion in that soft iron?

55. What is the most powerful magnetic force, the attractive or repulsive?

56. Is it possible to bring the two to act together without more complicated machinery than is necessary to make one available?

57. By which of these forces are the receiving magnet and the register worked in Morse's electro-magnetic telegraph; if by the attractive force, does it not give sufficient power for the purpose of making sounds or signs for telegraphic purposes?

58. If more power were wanted, could it not be obtained in a more simple manner, by adding one or more cups to the local battery than by introducing permanent magnets, and complicating the machinery for the purpose of bringing the repulsive force in aid of the attractive?

59. If a machine give sufficient power for the end to be accomplished, is it not a positive injury to make the machinery more complicated for the purpose of increasing the power?

60. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause; if yea set forth the same fully and at large in your answer.

Deposition of witnesses produced, examined, and sworn on the part of the complainant, in a certain cause pending in the circuit court of the United States, 8th circuit, district of Kentucky, wherein Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, are complainants, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, are defendants, under and pursuant to the commission and interrogatories hereunto annexed, taken at the mayor's office in the city of New York, in the city and county of New York.

Deposition of James Renwick.

(Deposition of James Renwick, taken under the foregoing interrogatories, to wit:)

James Renwick, a witness produced and examined, under and pursuant to the commission and interrogatories hereunto annexed, being duly sworn, doth depose as follows, viz:

1. To the first interrogatory he says: That he is fifty-seven years of

age, is professor of natural and experimental philosophy and chemistry in Columbia college; that he resides in the city of New York.

2. To the second interrogatory he says: That he is acquainted with the invention called Morse's electro-magnetic telegraph, that he became acquainted with it in its working form, first he believes in the building of the University of the city of New York, and subsequently at a rope-walk at the intersection of the Eighth avenue with the Bloomingdale road (in the city of New York,) and again in the Capitol at Washington, that he is unable to state the exact date at which he saw it in action in the two first places, but that he saw it in the Capitol at Washington, in the years 1841 and 1842, when he was transacting business with the State Department as commissioner of the northeastern boundary.

3. To the third interrogatory he says: That Professor Morse not only proposed, but, in the three cases cited, communicated intelligence by imprinting the signs at a distance.

4. To the fourth interrogatory he says: That Professor [Morse] did fully explain to him the apparatus set up on the occasion referred to in the answer to the second interrogatory, in the building of the University, but that he is unable to state the precise date, except that he believes it was before he saw it in action in [the] Capitol at Washington.

5. To the fifth interrogatory he says: That Professor Morse showed him machines and apparatus in action on the three occasions referred to in the answer to the second interrogatory, but that he, the deponent, only examined the machine closely in the New York University.

6, To the sixth interrogatory he says: That the machine which he examined at the New York University was substantially the same as that which is represented in the engraving marked "example 10," attached to the printed copy of the patent issued to Professor Morse, dated 20th June, 1840.

7. To the seventh interrogatory he says: That he was informed some time in the month of February or March last, that Professor Morse had other means of making signs at a distance, but has no direct knowledge of the fact.

8. To the eighth interrogatory he says: That Professor Morse originally intended to use a circuit composed of two wires, and believes that the first apparatus which he saw was so constructed. The deponent knows, that at the time that this first apparatus was making, few persons would have conceived it possible to convey intelligence by a single wire; he recollects *the* Professor Morse, about the time of the construction of his first apparatus, put the question to him, "whether two electrical currents could be pressed through a single wire," that he replied that as the term current was purely hypothetical he saw no impossibility, and advised Professor Morse to try; he further says, some time thereafter, he believes, when he saw him in 1841 or 1842, in the city of Washington, Professor Morse informed him he had "tried" and succeeded. This deponent therefore considers Professor Morse as the first

discoverer of an important philosophical fact, and beyond all question the first to invent and make a practical application of the said fact.

9. To the ninth interrogatory he says: That Professor Morse was a member with deponent of two different clubs, which met weekly in succession, for ten or twelve years, for about eight months of each year, and that he had frequent conversations with Professor Morse in relation to electricity and electro-magnetism; that, [on] one occasion Professor Morse consulted him in relation to the velocity with which electricity could be conveyed; that deponent referred him to an experiment recorded in an old edition of the Encyclopedia Brittanica, as made in the city of London, in which the river Thames, for a length of several miles, was made a part of the circuit, and in which, in spite of the imperfect conducting power of water, no appreciable time elapsed in the communication; that the deponent on this occasion inferred, if not positively so informed by Professor Morse, that he had in view the construction of a telegraph; that this conversation took place previous to a visit which Mr. Morse made to Europe; that this visit was made more than fifteen years since; that from the time of Professor Morse's return this deponent was aware that he was busily engaged in planning an electro-magnetic telegraph, and was so much occupied in this pursuit as to neglect his professional business; that this deponent was informed that the invention was completed a short time, say three or four months, before he first saw the apparatus' action, which was, as he believes, and has already stated, in the building of the university.

10. To the tenth interrogatory he says: That he has read the letters patent issued to S. F. B. Morse on the 13th June, 1848, being a second reissue of his original patent, together with the specifications thereto annexed; that the said specifications, with the drawings, appear full, clear, and exact, but that as he is not a professed machinist he would be unable to construct the same, although after the machine had been constructed the directions for the use thereof would enable him to employ it in the transmission of signals.

11. To the eleventh interrogatory he says: That not being a professed machinist he cannot reply positively yea or nay.

12 and 13th. To the twelfth and thirteenth interrogatories he replies in the same terms as to the 10th and eleventh.

14th. To the fourteenth interrogatory he replies: That the nine heads under which the claim of the patentee are included, at the close of the specification annexed to the letters patent granted 13th June, 1848, being a reissue of the patent granted 11th April, 1846, appear to the deponent to distinguish what is new from what is, or was, in the opinion of the patentee, old, and taken in connexion with the previous part of the specification, show clearly and sufficiently in what the improvement consists.

15 to 22. To the interrogatories numbered from fifteen to twenty-two inclusive, he says: That he has no knowledge whatever of the subjects to which the said interrogatories refer.

23. To the twenty-third interrogatory he says: That his acquaintance with the machine called Barnes and Zook's telegraph is limited to the inspection of a drawing exhibited to him 6th September, 1849, along with the interrogatories hereunto attached, and that he has verified this drawing as a part of this deposition by his signature, and the date of taking this deposition, 7th September, 1849.

24. To the twenty-fourth interrogatory he says: That he is acquainted, as stated in his previous replies, with the invention, patented to S. F. B. Morse; that he has read the patent issued 13th June, 1848; and that he believes the invention therein described to be substantially the same as the machines he saw in action on the occasions referred to in his answer to the second interrogatory; he therefore replies that he has seen the said invention in operation.

25. To the twenty-fifth interrogatory he says: That the interrogatories were submitted to him for the purpose of replying thereto for the first time on the sixth day of September, 1849, with notice that the deposition would be taken on the following day; that no time, therefore, is allowed him for making drawings of the two several inventions; that a full and complete description thereof could only be made intelligible by means of drawings, and that therefore he is at present unable to answer the said interrogatory.

26. To the twenty-sixth interrogatory he says: That having examined and written his name, and the date of 7th September, 1849, upon the drawings marked "Drawings of Barnes and Zook's telegraph," he is of opinion that the essential principles of Barnes and Zook's telegraph are the same as those of Morse's instruments.

27 and 28. To the twenty-seventh and twenty-eighth interrogatories he says: That the two instruments, as far as he can understand their operation, produce precisely the same results, and essentially upon the same principles.

The instrument of Barnes and Zook differs in its details from that of Morse, in the manner to be described by reference to the drawings. In Morse's instrument, the lever or bar of soft iron F moves on a pivot in alter[n]ate directions, under the action of the temporary magnet in the helix E and the spring H. In Barnes and Zook's instrument, this bar of soft iron, F, called by them the mutator, moves to and fro as it is magnetized or left unmagnetized by the current in the coil E, under the action of a fixed permanent magnet Z and the spring H. The cause of motion is in both cases the flow and the cessation of the electric current in the two respective coils E and E. It appears to the deponent to be a matter of indifference in principle, whether the mutator moves within the coil E, or a receiving temporary magnet within the coil set in motion the bar F, as in Morse's instrument. In practice the superiority is to be awarded to Morse's arrangement, inasmuch as the friction is less in his arrangement than in that of Barnes and Zook. The introduction by the latter of the permanent magnet Z is no change in principle, for the attraction and repulsion of soft iron is owing to its being magnetized by induction, and the induced magnet-

ism must be attained before motion can begin. Neither is a permanent magnet necessary in the arrangement, as the same effect might be produced by a piece of soft iron.

In Morse's apparatus the pen y is thrown forward upon the paper, passing between the rollers a and b by the attraction of the temporary magnet S in the coil R, and drawn back by the spring X. In Barnes and Zook's apparatus, the pen y is thrown forward by the attraction between the two poles of the *the* temporary magnet S in the coil R, and the two poles of the permanent horse-shoe magnet W V; the pen y is drawn back by the attraction of the same temporary magnet, when the current in the coil R is inverted, for the poles of the fixed permanent magnet W T. In both the cause of the motion is the magnetic action induced in a bar of soft iron by the electric current passing through the coils R and R. In Morse's the current is intermittent, and a spring acts in the interval. In Barnes and Zook's, the current is made to flow alternately in opposite directions through the same coil. Barnes and Zook's is therefore a more clumsy and complicated method of obtaining the same result by the application of the same force, generated and controlled in the same manner. Such being the nature of the differences, the deponent is of opinion that they do not affect the essential principles of the two instruments.

29. To the twenty-ninth interrogatory he says: That in his opinion the essential principle[s] of Morse's instrument are involved in that of Barnes and Zook.

30. To the thirtieth interrogatory he says: That the differences which he has noted between the two instruments have been set forth in his answer to the twenty-seventh and twenty-eighth interrogatories, and that the differences of Barnes and Zook's instruments from that of Morse do not constitute any improvement.

31 and 32. To the thirty-first and thirty-second interrogatories he says: That the registering instrument of Barnes and Zook is unknown to him, except as delineated on the annexed drawing.

33. To the thirty-third interrogatory he says: That the mutator and receiving magnet differ from each other in the fact that the former is moveable, the latter fixed, within their respective coils; that they resemble each other in being both pieces of soft iron, to which temporary magnetism is given by an electrical current.

34. To the thirty-fourth interrogatory he says: That the object to be attained by the register magnet in Morse's instrument is to attract the armature of soft iron T, for the purpose of throwing forward the pen y; in Barnes & Zook's instrument the register magnet performs the same act by its own motion; that the object of the mutator in Barnes & Zook's instrument is to break and close the main circuit; that the object of the receiving magnet in Morse's instrument is also to break and close the main circuit.

35. To the thirty-fifth interrogatory he says: That the object of the two combinations mentioned in the interrogatory is the same in both instruments, namely, to convey the signals from the main battery and

deliver them, by the aid of a new electro-magnetic force, derived from the local battery.

36. To the thirty-sixth interrogatory he says: That the power of electro-magnetism is essential to put both of the two apparatuses in motion.

37. To the thirty-seventh interrogatory he says: That the permanent magnets in the Columbian are not essential to the ultimate end proposed to be attained by both instruments.

38. To the thirty-eighth interrogatory he says: That a piece of soft iron might be an equivalent for the permanent magnet Z, and that the action of Barnes & Zook's instrument would be simplified by the use of a spring instead of one of the permanent horse-shoe magnets.

39. To the thirty-ninth interrogatory he says: That the mutator and the receiving magnet accomplish precisely the same results by means substantially the same in principle, namely, the communication and removal of temporary magnetism to and from a bar of soft iron by the intermitting passage of an electric [current] through a coil of wire.

40. To the fortieth interrogatory he says: That there is a disadvantage in making the temporary magnet move, inasmuch as its motion is attended with more friction, and will therefore demand the use of more powerful batteries, both main and local.

41. To the forty-first interrogatory he says: That it is not an established law in mechanics that a less weight will be moved by a less force than a greater, unless both weights are precisely under the same circumstances when it is an established law.

42. To the forty-second interrogatory he says: That the breaking and closing of two local circuits, instead of one, is a needless addition, and that as the part of the action which occupies an appreciable time in the instrument is the change in the temporary magnets from a quiescent to a polar state, the change in the poles effected by means of two circuits seems likely to be a positive disadvantage, inasmuch as it will occupy twice the time.

43. To the forty-third interrogatory he says: That the second circuit of the mutator is of no other use than to be an equivalent for the spring of the receiving magnet.

44. To the forty-fourth interrogatory he says: That in the action of the electro-magnet with the permanent magnets in the Columbian, there is an attraction as well as a repulsion; indeed the permanent magnet Z cannot act to repel the mutator.

45. To the forty-fifth interrogatory he says: That the action of a piece of soft iron placed in the position of the permanent magnet Z in Barnes & Zook's machine, would produce the same effect of attraction as the permanent magnet, because the soft iron would, in fact, become a temporary magnet by induction, but it could not be thus magnetized so as to produce repulsion. The substitution of a spring for one of the horse-shoe magnets in Barnes & Zook's local circuit would be a substitute either for its attraction or its repulsion, according to the side of the register magnet to which it was applied.

46. To the forty-sixth interrogatory he says: That so far as the local circuits are concerned, the object of both arrangements of electro-magnets is the same, and there is no difficulty in Morse's arrangement in obtaining more power than is necessary to accomplish both objects.

47. To the forty-seventh interrogatory he says: That he conceives that the Columbian would require a more powerful local battery to effect its object than Morse's.

48. To the forty-eighth interrogatory he says: That the permanent magnets appear to him a less simple and less convenient mode of applying the electro-magnetic power than that used by Morse.

49. To the forty-ninth interrogatory he says: That he cannot pretend to state by which of the several well known modes of magnetizing steel the permanent magnets of the Columbian have been constructed. In preparing them for this specific object, however, the batteries and coils of wire forming parts of the instrument would furnish sufficient, and probably the most convenient, means.

50. To the fiftieth question he says: That it is entirely unknown to scientific men how an electro-magnet receives its temporary magnetism, although it is well known that the passage of galvanic electricity through a wire gives magnetism to pieces of steel or iron lying nearly at right angles to the wire, and that the effect is rendered more intense, almost in exact proportion to the number of times that the wire, when wound into a helix or coil, crosses the steel nearly in that direction.

51. To the fifty-first interrogatory he says: That the magnetic force of an electro-magnet and of a steel magnet are essentially the same in kind, differing only in degree; that the softer the iron the more readily does it acquire, but at the same time the more readily does it part with magnetism.

52. To the fifty-second interrogatory he says: That it is by no means certain that the attraction and repulsion of magnets are due to two different agents, or to a difference in the action of one and the same agent. It is, however, more convenient in describing the phenomena to refer the two actions to two different agents or forces, and if there be two forces, both are unquestionably magnetic forces.

53. To the fifty-third interrogatory he says: That the term motive power is rarely or never used in the language of strict science, but would be understood by him as synonymous with the term "force," by which he would imply any cause whatever which is capable of giving motion to a body.

54. To the fifty-fourth interrogatory he says: That in the supposition in the interrogatory, if extended to the case he presumes it to be intended for, namely, equal force in the two magnets, and the soft iron placed at an equal distance from each, no motion would take place; but as such supposition is hardly possible to occur in practice, the piece of soft iron thus suspended would be drawn towards the magnet whose action upon it, having due regard both to the intensity of the

magnetic force and the distance, was greatest, and after reaching it would remain in contact with it.

55. To the fifty-fifth interrogatory he says: That there is no difference in the intensity of the attractive and repulsive forces exerted by the same two magnets upon each other at equal distances between their respective poles.

56. To the fifty-sixth interrogatory he says: That he does not consider it possible to make the attractive and repulsive forces of the same magnet act together and in one direction; they may, by acting alternately, or in opposite directions, concur in effecting a single object; and whether this alternate action would or would not absolutely require more complicated machinery than the action of one force only, deponent cannot pretend to say. In the case in question, the machinery of Barnes & Zook, in which both forces are called into action and into opposite directions, the apparatus is more complicated than that of Morse, in which the attractive force alone is called into action.

57. To the fifty-seventh interrogatory he says: That the attractive force alone is brought into action to work the receiving and registering magnets in Morse's machine, and this force alone does give sufficient force for the purpose of making sounds or signs for telegraphic purposes.

58. To the fifty-eighth interrogatory he says: That additional power, if wanted, could be attained in a more simple manner by adding more cups to the battery than by introducing permanent magnets.

59. To the fifty-ninth interrogatory he says: That all complication in machinery, beyond what is absolutely necessary, is a positive injury.

60. To the sixtieth interrogatory he says: That he has been acquainted with Professor Morse for more than thirty years; that for several years, while both were members of the two clubs mentioned in the answer to the ninth interrogatory, this deponent was on terms of familiar and constant intercourse; that their intimacy was promoted by a community of objects, this deponent having to Prof. Morse the relation of an amateur in Professor Morse's profession as an artist, while Professor Morse was curious and interested in the sciences which are the subjects of deponent's professorship in Columbia college; that he knows, as partly stated in answer to the ninth interrogatory, that Professor Morse had, before his visit to Europe, about the year 1830, paid much attention to the subjects of electricity and magnetism, and was aware, before he departed, that he was studying these subjects in reference to the plan of a telegraph; that deponent, in consequence, sought and obtained from Professor Morse, on his return from Europe the third time, the latest intelligence in relation to electro-magnetism, and in particular in relation to the constant battery of Professor Daniell, which was at that time a novelty; that Professor Morse, in replying, stated that he had procured and brought with him one of Daniell's batteries. That in addition to the intimacy growing out of membership in the clubs aforesaid, deponent and Morse were original associates of the New York Athenæum, established in 1825 or 1826, and both delivered courses of lectures before that association; that Dr.

James Freeman Dana was also a lecturer before the same association, and that his subject was electricity and its relations; that he well recollects Dr. Dana's lecture on common electricity, having aided him in setting up his apparatus; that he knows that one of Dr. Dana's lectures was upon magnetism, because he loaned him a rare work upon that subject, which work was lost to him in consequence of Dr. Dana's sudden illness and speedy death. That he believes that Professor Morse was present at the lectures of Dr. Dana, inasmuch as it was the custom of the lecturers to attend each other's courses, and any absence would have been matter of remark. That when the interrogatories were put into his hands by Professor Morse he was not positively certain that one of Dr. Dana's four lectures were devoted to the subject of electro-magnetism; but that in the course of conversation Professor Morse spoke of a permanent magnet caused to revolve upon its own axis by an electric current, as one of the experiments exhibited by Dr. Dana; that this deponent thereupon recollected the said apparatus, and that he had had one made for the apparatus of Columbia college, which was a copy of the apparatus of Professor Dana; that this recollection has established in the mind of this deponent the certainty both that Dr. Dana did lecture on electro-magnetism, and that Professor Morse was present at that particular lecture; that the apparatus in question is rare, and was the invention of Dr. Dana, and that he believes no others have ever been made than the original one of Dr. Dana and the copy now in the collection of Columbia college. That the lectures of Professor Dana before the Athenæum were delivered, to the best of this deponent's recollection, in February or March, 1827, and before Professor Morse made the visit to Europe which has been spoken of in the answers to these interrogatories.

This deponent further says, that he saw Professor Morse for the first time in London in 1816, and knows that he was long resident in that city; that the discovery of Sir Humphrey Davy, on which the science of electro-magnetism is founded, took place while Professor Morse resided there, and made a great noise at the time; that this discovery, together with the additions made to it by Oersted, were so familiarly known previous to 1827, that he cannot believe that Prof. Morse, whose tendency to scientific inquiries was decided, could have been ignorant of them.

This deponent further says, that the alphabet of Professor Morse, composed of no more than two characters, is essential to the action of Barnes and Zook's instrument, and that however variously the two characters may be combined to represent letters, figures, and words, it remains to all intents and purposes the same, namely, a dot and a short line.

This deponent finally says, that he had introduced the subject of electro-magnetism into the first full course of lectures which he delivered in Columbia College, in the years 1821 and 1822, and had published a text book containing the heads of those lectures in the year 1823, and that he does not know, nor can set forth, any other matter or

thing which may be of advantage or benefit to the parties at issue in this cause, or either of them, or that may be material to the subject of his examination or the matters in question in this cause.

JAS. RENWICK.

Written, subscribed, and sworn before me, this 7th day of September, 1849.

C. S. WOODHULL,
Mayor of the city of New York.

Deposition of James R. Chilton, taken under the interrogatories copied herein on page 557.

Deposition of J. R. Chilton.

James R. Chilton, a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, being first duly sworn upon the holy evangelist of Almighty God to state the truth, doth depose as follows:

1st. To the 1st interrogatory he says: I am 40 years of age; my profession is that of a practical chemist and doctor of medicine; I reside in the city of New York.

2d. To the second interrogatory he says: I am. I first saw it in the building of the University of New York, in the year 1837, and subsequently in Nassau street. In each instance it was in actual operation. I was invited to see it in 1837, at the University; and in Nassau street I was one of a committee of the American Institute, to examine it.

3d. In answer to the 3d interrogatory he says: It was by imprinting a sign at a distance.

4th. In answer to the 4th interrogatory he says: He did describe such apparatus, first, at the University of the city of New York, and also in Nassau street.

5th. In answer to the 5th interrogatory he says: He did, at the times stated in the previous interrogatories.

6th. In answer to the 6th interrogatory he says: Example No. 10, attached to the printed and certified copy of Professor Morse's patent, dated the 20th of June, 1840, is an accurate drawing, delineating the apparatus or machine shown to me at the University of New York. I have placed my name and the date of taking this deposition upon the said certified copy of letters patent and said example No. 10, and have annexed the same to this my deposition, and to which I refer.

7th. In answer to the seventh interrogatory he says: I do not know that he did.

8th. In answer to the 8th interrogatory he says: He proposed to employ only one circuit.

9th. In answer to the 9th interrogatory he says: I know that Professor Morse was engaged in constructing a telegraph as early as the year 1835, and that he had completed the machinery as before spoken as early as the year 1837.

10th. In answer to the 10th interrogatory he says: I have read it.

11th. In answer to the 11th interrogatory he says: I think they could without doubt.

12th. In answer to the 12th interrogatory he says: I have read it, and I consider the drawings and explanation sufficiently clear to enable me to direct a mechanic how to construct such an instrument, and to understand how to use.

13th. In answer to the 13th interrogatory he says: In my opinion it does.

14th. In answer to the 14th interrogatory he says: It is my opinion that it does.

15th to 21st. In answer to the 15th, 16th, 17th, 18th, 19th, 20th, and 21st interrogatories he says: I know nothing of the matters inquired of in these interrogatories, except by hearsay.

22d. In answer to the 22d interrogatory he says: I was not.

23d. In answer to the 23d interrogatory he says: I am not, except the knowledge acquired by examination of a drawing of the instrument which is annexed to my deposition.

24th. In answer to the 24th interrogatory he says: I am; I have read the patent, and have seen the invention in operation.

25th. In answer to the 25th interrogatory he says: The telegraph of Professor Morse is sufficiently described in the specification and drawings hereunto annexed. That to describe that of Barnes and Zook, other than by a reference to the same hereunto annexed, would be but a repetition of the explanation accompanying the drawing.

26th. In answer to the 26th interrogatory he says: That upon examination of said drawing, which is all the knowledge I have of that instrument, I think the essential principle of the two instruments is the same.

27th. In answer to the 27th interrogatory he says: They produce the same result upon the same principle essentially.

28th. In answer to the 28th interrogatory he says: The answer to the last interrogatory is a sufficient answer to this.

29th. In answer to the 29th interrogatory he says: It is.

30th. In answer to 30th interrogatory he says: There is a difference in mechanical arrangement and in the use of permanent magnets, but this does not alter the principle, nor do I consider it any improvement.

31st. In answer to the 31st interrogatory he says: The two registering instruments appear to differ only on account of the permanent magnets being used in that of Barnes and Zook.

32d. In answer to the 32d interrogatory he says: They appear to and do resemble each other, on account of each having an arrangement for forming an electro-magnet, and without which neither would produce the intended result.

33d. In answer to the 33d interrogatory he says: They appear to differ, because the electro-magnet formed in the mutator moves towards the attracted object, while in the receiving magnet the attracted object moves towards the electro-magnet.

34th. In answer to the 34th interrogatory he says: The object of the register is the same in each instrument, viz., to print or register characters at a distance; the object of the mutator is to establish through the agency of an electro-magnet a metallic connexion between a galvanic battery and the register, by which a current of electricity is made to pass from the battery to a helix around a piece of soft iron, thereby producing an electro-magnet, constituting a part of the register; the object of the receiving magnet in the other instrument is precisely the same.

35th. In answer to the 35th interrogatory he says: The object of each is the same in both instruments, as explained in the answer to the last interrogatory; the ultimate object in both is the imprinting of characters.

36th. In answer to the 36th interrogatory he says: It is.

37th. In answer to the 37th interrogatory he says: The permanent magnets in the Columbian are of service as the instrument is constructed, but they could be dispensed with by using in their place a piece of soft iron and spring.

38th. In answer to the 38th interrogatory he says: They would, as already stated.

39th. In answer to the 39th interrogatory he says: It does.

40th. In answer to the 40th interrogatory he says: As the instrument is constructed it is especial advantage that the electro-magnet moves, but the same instrument could be constructed to act equally well by having the electro-magnets fixed and the permanent magnets or armatures made to move.

41st. In answer to the 41st interrogatory he says: I believe it is.

42d. In answer to the 42d interrogatory he says: I do not know of any advantage in having two circuits; one answers every purpose.

43d. In answer to the 43d interrogatory he says: I do not know that it has any other use than what could be effected by a spring.

44th. In answer to the 44th interrogatory he says: There is.

45th. In answer to the 45th interrogatory he says: They would.

46th. In answer to the 46th interrogatory he says: The object of the electro-magnet is ultimately the same, viz., to obtain power to mark or imprint, and in Morse's arrangement there is no difficulty in obtaining all the power requisite.

47th. In answer to the 47th interrogatory he says: I do not know of any advantage that the Columbian arrangement has over that of Morse's, nor any especial disadvantage it has, except in being more complicated.

48th. In answer to the 48th interrogatory he says: I think there is no advantage gained by using permanent magnets.

49th. In answer to the 49th interrogatory he says: The permanent or steel magnet is rendered magnetic in various ways; the most usual way is by passing the poles of a permanent magnet, bent in the form of a horse-shoe, several times from one extremity to the other of a piece of steel; a piece of native loadstone or an electro-magnet may be used

to effect the same object; steel may also be rendered permanently magnetic by placing it in a helix conducting a current of galvanism.

50th. In answer to the 50th interrogatory he says: An electro-magnet is made by passing a wire or other conductor several times around a piece of soft iron; the extremities of the wire are to be connected with a galvanic battery so as to form a metallic circuit; when the battery is put into action and the circuit of the wire is complete, the iron instantly becomes magnetic; when the circuit is broken or interrupted, the iron ceases to be magnetic.

51st. In answer to the 51st interrogatory he says: I consider the power or force of the electro-magnet and that of the permanent magnet to be of the same kind.

52d. In answer to the 52d interrogatory he says: I believe it is generally considered among scientific men that the attraction and repulsion of magnets are powers or forces of the same kind; but acting in different directions; one is as properly termed a magnetic power as the other.

53d. In answer to the 53d interrogatory he says: A power applied to set a piece of machinery in motion.

54th. In answer to the 54th interrogatory he says: The magnetized soft iron moves to one or the other of the permanent magnets, depending upon the polarity given to the electro-magnet.

55th. In answer to the 55th interrogatory he says: I believe the attractive and repulsive powers are equal.

56th. In answer to the 56th interrogatory he says: I do not know of any way in which the available power of the two can be obtained as readily as one, without involving a complication of machinery.

57th. In answer to the 57th interrogatory he says: By the attractive force. The power is quite sufficient for telegraphic purposes.

58th. In answer to the 58th interrogatory he says: The power could be more readily increased by increasing the battery than by the use of permanent magnets.

59th. In answer to the 59th interrogatory he says: I have no doubt that it would be an injury rather than a benefit.

60th. In answer to the 60th interrogatory he says: That, in the year 1827, there was published at Philadelphia the work by Jacob Green, M. D., entitled "Electro-magnetism; being an arrangement of the principal facts hitherto discovered in that science, with plates of the apparatus."

The following is a true extract from page 26th [of the] work: "Take a piece of unmagnetized iron bent in the form U, and twist a piece of copper wire eight or ten times round it; a few inches of the wire are to be left projecting on each side of the instrument. (See plate 1, fig. 3.) Now, upon connecting the extremities of this wire with the opposite poles of a galvanic battery, the curved iron bar will act as a horse-shoe magnet, and attract by its inductive force any ferruginous body within its influence. The quantity of iron lifted by an apparatus similar to the above is astonishingly great."

The following is a true extract from page 58 of that work:

"To exhibit the revolution of a magnet on its own axis. The instrument for showing this fact was devised by my friend, the late Dr. Dana, professor of chemistry in the University of New York; he constructed it without knowing of the previous contrivances of Ampére and Barlow for the same purpose, and to both of which it is decidedly preferable. See Edin. Journal, v. viii, page 371."

The following are true extracts from pages 153 and 154 of that work:

"I am indebted to the late Dr. J. F. Dana, professor of chemistry in the University of New York, for the following clear and concise view of the phenomena of magnetism. Professor Dana was perfectly familiar with all the facts and theories connected with electro-magnetism, and I shall always recollect with pleasure his instructive conversation on this subject. No one of his experience had clearer views of chemical science, was more expert in analysis, or more ingenuous in drawing conclusions from facts. His untimely death will ever be lamented by the friends of virtue and science. In this little book, devoted to his favorite pursuit, no apology will be necessary for this passing tribute to the memory of such a friend. One of the periodical journals in New York speaks of his death in the following terms: 'We were sensibly shocked to-day (15th of April, 1827,) in receiving the melancholy and, to us, most unexpected notice of the death of Professor Dana. It is so few days since we were listening, among many others, to one of his admirable lectures on chemistry; he was then apparently so full of health, and life, and intelligence, that the fearful truth of his sudden decease seemed scarcely credible to us. It is, however, one of those startling realities that laugh to scorn the calculations of human presumption, and almost make a mockery of the affections of the heart when lavished upon beings so frail and transitory as we are all."

He, deponent, saw many articles of Professor Dana's magnetic apparatus, some of which had been painted with red sealing wax varnish; hence deponent, at the time of writing the letter, was under the impression that the electro-magnet, therein referred to, was covered with sealing wax varnish of that color.

Deponent has now produced to him an electro-magnet contained in a bag of leather buckskin, upon which is written the words, John Torry, September 10th, 1849, and which magnet has been made an exhibit in this cause in the deposition annexed to the commission in this cause. This deponent has also written upon the said bag, in which the magnet is contained, his name and the date of the taking of this deposition, and has annexed said bag and magnet by red tape to this deposition.

The said electro-magnet, contained in said bag, he now recognises as the same, and believes it to be the same, which he saw in the possession of Professor Dana in the year 1827, and was used by him in his experiments. At the time he lectured in New York, in 1827, that magnet was at my father's store, and was often examined by deponent, and served as a model by which deponent made one like it.

At the time that Professor Dana lectured before the Athenæum, in

New York in the years 1826 or 1827, the subject of electro-magnetism excited much curiosity among scientific men, and was the topic of much remark in scientific circles.

Deponent has examined in the library of the New York Society library a bound volume of the New York Daily American, a paper published in the city of New York in the year 1827. In that paper, under date of April 16th, 1827, (the 15th being Sunday,) an obituary notice of Professor Dana, in the precise language quoted by Dr. Jacob Green in his work above alluded to, with the exception of the words in parenthesis, ("15th April, 1827,") and has no doubt that Dr. Green's extract was taken from that paper.

Deponent now exhibits, and makes an exhibit in this cause, a drawing of figure No. 3, in plate 1, of Dr. Green's work, and which is referred to in the above extract from page 26 of that work. Deponent has written upon said exhibit his name, and the date of the taking of this deposition, and the letters A, B, C.

Deponent further says, that, on or about the 27th of February, 1847, he received, through the New York despatch post, a letter from Professor Samuel F. B. Morse, which original letter he now produces, and makes an exhibit in this cause, and has annexed the same to this deposition, and upon which he has written his name, and the date of the taking of this deposition.

That on or about the 12th of March, 1847, deponent, in reply to said letter, wrote a letter to the said Morse; which letter is now shewn to deponent, and made an exhibit in this cause, and is annexed to this his deposition, and upon which he has written his name, and the date of the taking of this deposition.

Deponent believes it hardly possible that a person on terms of social intercourse with men of science, then resident in the city, could have been ignorant of the subject of electro-magnetism.

Deponent does not know, nor cannot set forth, any other matter or thing which may be of benefit or advantage to the parties in this cause, or to either of them, or that may be material to the subject of this his examination, or the matters in question in this cause.

JAMES R. CHILTON, *M. D.*

Sworn this 11th day of September, 1849, before me,
C. S. WOODHULL, *Mayor.*

The following are the letters referred to, and filed as exhibits with the foregoing deposition, to wit:

Correspondence between S. F. B. Morse and J. R. Chilton.

NEW YORK, *February 26th*, 1847.

MY DEAR SIR: In conversation with you a few days ago I had occasion to speak of Professor James Freeman Dana, and more especially of his lectures on electro-magnetism, before the New York Athenæum, in the chapel of Columbia college, in the year 1826, during the same

season in which I gave before the same institution my first lectures on the fine arts. Your recollection coincided with mine and Mr. Pike's, in regard to his experiments with an electro-magnet. Will you oblige me with a letter which shall detail, as minutely as you can recollect, the following particulars concerning it:

1st. The form, and size, and color of the iron forming the magnet.

2d. The kind of wire used for his helix; whether it was covered by an insulating substance or not; if not, how insulated from the iron.

3d. Any other particulars respecting that experiment, or other electro-magnetic experiments.

I am collecting early facts in relation to my own invention of the telegraph, and wish this fact in such a form that proper credit may be given to Professor Dana, by whose early death science and our country was deprived of one of their most promising ornaments.

Truly, with respect, your most obedient servant,

SAM. F. B. MORSE.

To Dr. JAMES CHILTON.

I, Caleb S. Woodhull, mayor of the city of New York, do hereby certify, that the within letter was produced and made an exhibit before me, and marked as such on the taking of the deposition of James R. Chilton, under and pursuant to the commission and interrogatories hereunto annexed, and the same then and there annexed to said deposition.

In witness whereof I have hereunto set my hand and affixed my official seal, this 11th day of September, A. D. 1849.

[L. S.]

CALEB S. WOODHULL.

NEW YORK, *March* 12, 1847.

MY DEAR SIR: I would have replied to your letter sooner, had I not felt desirous of refreshing my memory by referring to certain documents in my possession, which have been laying aside for several years.

The first electro-magnet I recollect to have seen, was one which belonged to the late Professor James Freeman Dana, while he was professor of chemistry in the Medical college in Barclay street of this city, in the year 1826 or 1827. It consisted of a rod of $\frac{3}{8}$th inch iron, and about 10 inches long, bent into the usual horse-shoe form, and had a piece of copper wire wound rudely around it in a spiral form, the two ends of the wire left projecting some 8 or 10 inches, for the purpose of attracting it to a galvanic battery. Both the piece of iron and the copper wire had been previously covered with red sealing wax varnish, to insulate them. When the ends of the wire were attached to the poles of a small calorimeter in action, the magnet supported pieces of iron weighing several pounds.

Very truly, yours,

JAMES R. CHILTON.

Prof. SAM'L F. B. MORSE.

I, Caleb S. Woodhull, mayor of the city of New York, do certify,

that the within letter was produced and made an exhibit before me, and marked as such, on the taking of the deposition of James R. Chilton, hereunto annexed, under and pursuant to the commission and interrogatories hereunto annexed, and the same then and there annexed to said deposition.

In witness whereof I have hereunto set my hand and affixed my official seal, this 11th day of September, A. D. 1849.

[L. S.]

CALEB S. WOODHULL.

Deposition of John Torry.

(Deposition of John Torry, taken under the interrogatories copied herein on page 557, to wit:)

John Torry, a witness produced and examined under and pursuant to the commission and interrogatories hereunto annexed, first duly sworn upon the holy evangelist of Almighty God to speak the truth, doth depose as follows, to wit:

1. To the first interrogatory he says: That he is fifty-three years of age, is professor of chemistry in the college of physicians and surgeons in the city of New York, and that he resides at present in Princeton, New Jersey.

2. To the second interrogatory he says: That he is acquainted with the invention called Morse's Electro-magnetic Telegraph; that he saw it in operation substantially in the form represented in the drawing hereunto annexed, and signed with his name and the date of this deposition, to the best of his remembrance in the autumn of 1837, in the New York city University buildings, on Washington square. He was invited to attend the exhibition of the telegraph by Dr. Gale.

3. To the third interrogatory he says: By marking or printing signs at a distance.

4. To the fourth interrogatory he says: Professor Morse did describe to him the apparatus alluded to in the answer to the second interrogatory.

5. To the 5th interrogatory he says: His answer to this is contained in his answer to second interrogatory.

6. To the sixth interrogatory he says: The exhibit hereunto annexed, and referred to in his answer to interrogatory No. 2, is a correct drawing, delineating said apparatus or machine shown to him. Its operation is as follows, viz: Upon one side of a common table was erected a portion of a common stretching frame for canvas XX, to serve as the support of the machinery; at one end of this frame was a wooden clock, D, which was adapted to move at a regular rate a strip of paper designed to receive the marks to be imprinted. The paper was wound upon a cylinder, A, and passing over another cylinder, B, was wound again on C after being printed or marked upon B. The marking or printing was made in the following way: Above the cylinder, B, a pendulum, F, leaving a pivot at f, was lightly suspended. On the cross piece of the stretching frame, at h, was a small shelf on

which was fixed an electro-magnet. The armature of said magnet was fixed to the moveable pendulum, opposite and near to the poles of the magnet. A weight or spring, when the electro-magnet was not charged, kept the pendulum at a short distance from the magnet. At the lower part of the pendulum a pencil moving up and down freely, but with a small weight upon it, had its point in constant contact with the paper, so that when the pendulum was stationary and the paper was in motion, a long unvaried line was drawn along the paper. To produce a variety in the line Prof. Morse used the following method. The extremities of the wires of the helices of the electro-magnet h were extended after passing many times back and forth in the room; one to one pole of a galvanic battery, I, the other went to one of two small mercury cups, k, l, near each other, and then from the other cup to the other pole of the battery; the circuit thus formed was interrupted between the two cups. Now, to move the marking pendulum it was only necessary to close the circuit at the two cups, a fork of wire dipping into each cup allowed the electricity to pervade the circuit charging the electro-magnet, which then drew the pencil point at right angles to the usual line. To accomplish this so as to make variety, Prof. Morse had a kind of cogged type, (marked in drawing, 1, 2, 3, 4, &c.,) to interrupt and close the circuit, regularly set in a rule, and passed by an endless band and a crank beneath a lever, oo, having on one end of it the fork for dipping into the cups as the cogs of the type lifted or depressed the lever. This operation made a variety in the line, as seen in "specimen of the writing" in the drawing which enabled him to indicate any letter, word, or sentence. The foregoing is substantially a description of the apparatus I then saw in operation, and I believe it to be sufficiently definite to be understood in connexion with the drawing.

7. In answer to the 7th interrogatory he says: He did not, to my present recollection.

8. In answer to the 8th interrogatory he says: He only proposed one at that time.

9. In answer to the 9th interrogatory he says: That for several years after Prof. Morse exhibited to him his first telegraph he had frequent interviews with him, and he freely communicated to him from time to time the improvements which he made in the various parts of his apparatus.

10. In answer to the 10th interrogatory he says: That he has read the same, and can fully answer in the affirmative.

11. In answer to the 11th interrogatory he says: He thinks he could; he has no doubt of it.

12. In answer to the 12th interrogatory he says: His answer is the same as to question 10.

13. In answer to the 13th interrogatory he says: He could.

14. In answer to the 14th interrogatory he says: It does.

15 to 20th. In answer to the 15th, 16th, 17th, 18th, 19th and 20th,

he says: That he knows nothing of the subject of these interrogatories.

21. In answer to the 21st interrogatory he says: He has not.

22. In answer to the 22d interrogatory he says: He was not.

23. In answer to the 23d interrogatory he says: All the knowledge he has of that instrument is what he has derived [from the drawing] exhibited to him, upon which drawing he has written his name, and the date of the taking of this deposition, and the same has heen annexed to his deposition, and to which he refers.

24. In answer to the 24th interrogatory he says: He is acquainted with those inventions. He has read his patent of June 13, 1848, and has seen the invention in operation, and that it is the same essentially as that described by him in answer to interrogatory No. 6, and the drawing referred to by him in his 2d interrogatory.

25. In answer to the 25th interrogatory he says: The descriptions and drawings of Morse's and Barnes and Zook's telegraphs, are accurately given in the exhibit on which he has written his name, with the date of taking this deposition, and are sufficient for giving a knowledge of the peculiarities of each apparatus, from the main battery to the register.

26. In answer to the 26th interrogatory he says: From his examination of the drawings of Barnes and Zook's telegraph, exhibited to him, with the explanatory notes, (which is the only knowledge that he has of that instrument,) he is of opinion that it is the same in principle as Morse's instrument.

27. In answer to the 27th interrogatory he says: They produce the same result upon the same principles.

28. In answer to the 28th interrogatory he says: It will at once be *percepible*, from the descriptions and drawings of the two instruments, that there is a difference in the arrangement and mechanical structure of Barnes and Zook's instrument. It however produces the same result as the instrument of Morse, and by the same means, to wit, that of electro-magnetism. In Barnes and Zook's instrument, one current of electricity causes the pen lever to press the paper; the reversal of that current produces the withdrawal of the pen from the paper. In Morse's instrument, the pen lever is pressed to the paper by the same means, and is withdrawn by interrupting the current without the use of a reverse current. The spiral spring in Morse's instrument serves as an equivalent (in connexion with a cessation of the current) for the reversal of the current in Barnes & Zook's telegraph. This difference in the two instruments does not affect their essential principles.

29. In answer to the 29th interrogatory he says: I believe it is.

30. In answer to the 30th interrogatory he says: I think it does not.

31. In answer to the 31st interrogatory he says: That in Morse's instrument the fillet or paper is embossed by the pen while passing over a grooved roller, and in Barnes & Zook's instrument by the fillet passing over a grooved fixed surface.

32. In answer to the 32d interrogatory he says: They resemble each other in all respects, except as stated in the answer to the 31st interrogatory.

33. In answer to the 33d interrogatory he says: In Barnes & Zook's instrument the helix (or long coil of wire) is fixed, while the soft iron is rendered a magnet by the electric current, [and] is moveable through the hollow axis. In Morse's instrument the helix and the soft iron axis are both fixed.

34. In answer to the 34th interrogatory he says: The use of the register magnet in Morse's telegraph is to attract the iron armature which moves the pen. In Barnes & Zook's telegraph, the register magnet itself moves the pen.

35. In answer to the 35th interrogatory he says: The answer has been already given.

36. In answer to the 36th interrogatory he says: It is.

37. In answer to the 37th interrogatory he says: They are not essential.

38. In answer to the 38th interrogatory he says: They would.

39. In answer to the 39th interrogatory he says: They do.

40. In answer to the 40th interrogatory he says: There is a disadvantage.

41. In answer to the 41st interrogatory he says: It is.

42. In answer to the 42d interrogatory he says: He sees no advantage in multiplying the circuits.

43. In answer to the 43d interrogatory he says: It is not.

44. In answer to the 44th interrogatory he says: There is.

45. In answer to the 45th interrogatory he says: Yes; it would.

46. In answer to the 46th interrogatory he says: The object is the same, and there is no difficulty in procuring more power than is necessary.

47. In answer to the 47th interrogatory he says: There is no advantage.

48. In answer to the 48th interrogatory he says: He thinks not.

49. In answer to the 49th interrogatory he says: There are several methods, but the most common method is by friction with other magnets.

50. In answer to the 50th interrogatory he says: By the current of electricity from the battery.

51. In answer to the 51st interrogatory he says: They are essentially alike.

52. In answer to the 52d interrogatory he says: It is an unsettled question in science.

53. In answer to the 53d interrogatory he says: It is that which induces motion.

54. In answer to the 54th interrogatory he says: If it were equidistant from each it would, in his opinion, be in the condition of the ass between the provender and the straw.

55. In answer to the 55th interrogatory he says: That in the same magnet they are equal.

56. In answer to the 56th interrogatory he says: He thinks not.

57. In answer to the 57th interrogatory he says: By the attractive, it does.

58. In answer to the 58th interrogatory he says: In his opinion the increase of power can be more conveniently obtained by increasing the battery.

59. In answer to the 59th interrogatory he says: It is.

60. In answer to the 60th interrogatory he says: He was well and intimately acquainted with Prof. James Freeman Dana prior to his death, in the year 1827. He died, after a short illness, on the 15th day of April, in the year 1827; and he was appointed his successor as professor of chemistry, in the College of Physicians and Surgeons in the city of New York, in the summer of 1827. He became the purchaser of all his apparatus shortly after his death; and among other articles which he purchased, which Prof. Dana had at the time of his death, was an electro-magnet, which is now shown to him, and which is contained in a buckskin bag, and upon which he has written his name and the date of this deposition; and which bag and magnet therein are attached to this deposition by a piece of red tape, and to which exhibit he (deponent) refers. He fully believes, and has no doubt, that said magnet was owned and used by Prof. Dana in his lectures in the city of New York in the spring of 1827. He saw, as he believes, this magnet in Prof. Dana's possession at the time that he was lecturing on electro-magnetism before the New York Athenæum in the spring of the year 1827, and has no doubt of its identity. This was the first electro-magnet that deponent ever saw, and he saw it, in the spring of 1827, in Prof. Dana's possession. At that time it excited much interest among men of science. Prof. Dana was among the first that lectured upon electro-magnetism in the city of New York; and his lectures upon that science were attended by a large and respectable audience, and were at the time a familiar topic of conversation among intelligent people of the city. The science was then so new and abstruse that the deponent intimated to Prof. Dana that he wondered at its being selected as a subject for popular lectures; to which Prof. Dana replied (in substance) that it could be made sufficiently plain and interesting to be appreciated by such an audience as his, and that it was a favorite department of science with him.

Prof. Dana had already made important discoveries in electro-magnetism, and was still occupied in his researches on that subject at the time of his death. He freely and with much enthusiasm communicated his results to those scientific and literary friends with whom he was associated or intimate.

In the month of March, 1847, he (deponent) received a letter from Professor Samuel F. B. Morse, dated March 4th, 1847. He has caused diligent search to be made among his letters and papers for said original letter, but the same cannot now be found. He believes, and has

no doubt, said original letter has been lost or destroyed. He has a distinct recollection of its contents; that a copy thereof, which he has seen in the possession of Professor Morse, is a true copy of said original letter. Deponent's recollection of the contents of said original letter is so distinct (after having perused said copy for the purpose of refreshing his memory) he now says he has no doubt that the original was in the words and figures following, to wit:

NEW YORK, NASSAU STREET,
March 4th, 1847.

Prof. TORRY.

MY DEAR SIR: In conversing a day or two since with Mr. Pike and Doctor Chilton, concerning the electro-magnetic apparatus of Professor James Freeman Dana, they informed me that much if not most of his apparatus was purchased by you. Have you the horse-shoe magnet covered with red sealing-wax, around which he made a single coil of uninsulated wire, each turn separated from its neighbor about a quarter or eighth of an inch, and with which he illustrated, at his lectures before the New York Athenæum, the electro-magnet? If you have, and would like to part with it, I should be pleased to be the purchaser.

With sincere respect and esteem, dear sir, your obe't serv't,
SAM. F. B. MORSE.

Pray do you know Professor Dean, formerly of Dartmouth college, and can you tell me if he is in the city?

That deponent, on the 8th of March, 1847, called at the New York Observer office to inquire for Professor Morse; that not finding him there, he wrote a letter to Professor Morse under that date, which he now produces and makes an exhibit in this cause, and upon which he has written his name and the date of the taking of this deposition; that he left said letter for Prof. Morse at the office of the Observer *office*, and at the same time that he also left for him the electro-magnet referred to in the said letter, and which has been heretofore referred to by deponent in his deposition. There were other articles of electro-magnetic apparatus belonging to Professor Dana which were covered with red sealing-wax varnish, and this, deponent supposes, is the reason that Professor Morse was mistaken respecting the color of the particular apparatus alluded to, and so inferred at the time of writing deponent's answer to him.

Deponent further says he does not know, nor can he set forth, any other matter or thing which may be of benefit or advantage to the parties at issue in this cause or either of them, or that may be material to the subject of this his examination, or the matters in question in this cause.

JOHN TORREY.

Sworn this 10th day of September, 1849, before me,
C. S. WOODHULL,
Mayor of the city of New York.

676.

Letter of Jno. Torrey to S. F. B. Morse.

The following is the letter referred to, and filed as an exhibit with the foregoing deposition, to wit:

OBSERVER OFFICE, MONDAY MORN.,
March 8th, 1847.

MY DEAR SIR: I received your letter on Saturday, and brought down this morning the piece of apparatus which must be the one alluded to in your letter. It is however covered with "black" instead of "red sealing-wax varnish." If it is of any use to you, I beg you will accept of it. I am sure it is the one used by Professor Dana in his lectures before the New York Athenæum.

I know Professor Dean, but cannot tell his whereabouts. If he is in town, some of the mathematicians must know where he can be found.

Yours, very cordially,
JOHN TORREY.

Prof. MORSE.

I, Caleb S. Woodhull, mayor of the city of New York, do certify, that the within letter was produced and made an exhibit before me, and marked as such on taking the deposition of John Torrey hereunto annexed, under and pursuant to the commission and interrogatories hereunto annexed, and the same was then and there annexed to said deposition.

In witness whereof I have hereunto set my hand and affixed my official seal, this 11th day of September, A. D. 1849.
[L. S.]
CALEB S. WOODHULL.

Deposition of R. Rankin.

Deposition of Robert Rankin, taken under the interrogatories copied herein on page 557, to wit:

Robert Rankin, a witness produced and examined under and pursuant to the annexed commission and interrogatories, being first duly cautioned and sworn upon the holy evangelist of Almighty God to speak the truth, did depose and say as follows:

2d. In answer to the 1st interrogatory he says: I am 43 years old; lawyer and farmer, residing at Fishkill landing, State of New York.

In answer to the 2d interrogatory he says: I am somewhat acquainted with Morse's magnetic telegraph; I became acquainted with it in the latter part of the year 1835, as near as I can recollect. I visited the rooms of Prof. Morse, on his invitation, in the north wing of the University building, in the city of New York; which part of the building was not entirely finished, or was then undergoing repairs in the north tower.

In answer to the 3d interrogatory he says: By imprinting the signs at a distance.

In answer to the 4th interrogatory he says: He did, at the time and

in the place stated in the 2d interrogatory, show me the apparatus alluded to in said 2d interrogatory.

In answer to the 5th [interrogatory] he says: He did, at the time and place stated, in answer to 2d interrogatory.

In answer to the 6th interrogatory he says: I now exhibit and annex to this my deposition a drawing or sketch of said apparatus, or machine, then shown to me, as near as I can recollect, and upon which I have written the date of this deposition and my name. I do not now distinctly recollect the precise mode of operating said machine at that time. I can only say, the general characteristics of the machine are presented in the drawing alluded to, and annexed as aforesaid.

To the 7th interrogatory: Have no recollection that he did.

In answer to 8th interrogatory: He only proposed one wire, or single circuit, as far as I recollect.

To the 9th: I cannot answer more fully than I have done.

In answer to the 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, he says: I have no knowledge in reference to any of the matters inquired about in these interrogatories.

In answer to 21st interrogatory: I have not.

In answer to 22d interrogatory: I was not.

In answer to 23d, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32d, 33d, 34th, 35th, 36th, 37th, 38th, 39th, 40th, he says: I am not acquainted with the instruments referred to in these interrogatories, nor have I seen the drawing referred to in the 26th; therefore, cannot answer in reference to the matters inquired of in them.

In answer to 41st: All things being equal, it is.

In answer to 42d, 43d, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52d, 53d, 54th, 55th, 56th, 57th, 58th, he says: These interrogatories relate principally to scientific questions, [on] which I do not wish to express an opinion.

In answer to 59th he says: It is.

In answer to 60th interrogatory he says: I do not know, nor can I set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in the cause, or either of them, or that may be material to the matters in question in this cause.

ROBERT G. RANKIN.

Sworn this 8th day of September, 1849, before me—

C. S. WOODHULL, *Mayor*.

Deposition of William W. Pell.

(Deposition of William W. Pell, taken under the interrogatories copied herein on page 557, to wit:)

William W. Pell, a witness, produced, examined, and sworn under and pursuant to the commission and interrogatories hereunto annexed, being first duly cautioned and sworn upon the holy evangelist of Almighty God to speak the truth, did depose and say as follows:

In answer to the interrogatories annexed to the commission in this

cause, from the first to the fifty-ninth interrogatories, both inclusive, he says: He was heretofore examined in this cause before the hon. William S. Havemeyer, late mayor of the city of New York, in the month of ———, now last past, under a commission executed before the late said mayor; that on such examination he stated fully and truly all *the* knew, or could depose or say, and all that he now knows, can depose or say, in reference to the several matters to which he is interrogated in and by the said several interrogatories above named; that deponent has been informed and believes that his deposition, taken under the former commission in this cause, has been filed by the clerk of the circuit court of the United States for the eighth Kentucky district; that he would refer to the said deposition as containing his answers to the said several interrogatories above named.

In answer to the 60th interrogatory he says: That, at the time of his former examination, as above stated, he did not call to his recollection the letters and correspondence now shown to him, and which are now produced to him and made exhibit, as hereinafter stated; that his attention not being then called to that correspondence, it did not then occur to him that the same could be material to either of the parties in this suit; and that for this reason he answered the said sixteenth interrogatory in the manner he did; but his attention being now called to the said letters, in further answer to the said sixteenth interrogatory, he now says, that at some time in the month of September, eighteen hundred and thirty-seven, he received a letter from Professor Samuel F. B. Morse, under date of 27th August, 1837; that said original letter has been lost or destroyed, and he verily believes that the same is not now in existence. He did not preserve it, not supposing it could ever be of any importance; that for the purpose of refreshing the deponent's recollection as to the contents of the said letter, he has examined what purports to be a copy thereof in the letter book of Professor Samuel F. B. Morse; that after thus refreshing his recollection, deponent can now state, that the said original letter, according to his present recollection, was as follows, viz:

NEW YORK CITY UNIVERSITY, *Aug't* 28, 1837.

DEAR SIR: You may have seen some notice in the papers of an electric telegraph of which I am the inventor. There is to be a contest it seems for priority of invention of this electric telegraph between England, France, Germany, and this country. I claim for myself, and consequently for America, priority over all other countries in the invention of a mode of communicating intelligence by electricity. My object in writing to you is to ask whether you remember my conversing on the subject of the electric telegraph as my invention when a (fellow) passenger with you on board the ship Sully, in the month of October, 1832? If you do, please inform me as soon as possible, and state precisely what you remember concerning it; your testimony to the fact of my having invented it at that time will be important in establishing the priority of the American invention.

Your obedient servant, S. F. B. MORSE.

That on the 27th of September, 1837, deponent wrote a letter to Professor Morse in answer to the foregoing letter, a letter which is now produced and made an exhibit in this cause, marked in red ink G, and upon which he has written his name and the date of the taking of this deposition, and has annexed the same to this his deposition; that at the time deponent wrote the said letter he verily believed the several matters therein stated were true in fact, and that after subsequent reflection he still believes the same to be true; that the said letter to Professor Morse was sent through the New York post office; that from the post mark he believes it was thus sent on the 28th of September, 1837; that on the first of February, 1838, deponent wrote another letter to Professor Morse, which is now produced, and made an exhibit in this cause, marked in red ink E, and upon which he has written his name and the date of the taking of this deposition, and has annexed the same to this his deposition; that at the time of writing the said last named letter he verily believed what he therein stated was true, and he now believes it to be true. I do not know any other passenger or person who returned with Professor Morse on board of the ship Sully, in October, 1832, who discovered or invented, or who communicated the discovery or invention of an electric telegraph, claimed to have been discovered by Professor Morse at that time, and for which a patent has been granted to him; that this deponent does not know, nor can he prove, that the idea of said telegraph originated with any other person than the said Professor Morse.

That deponent cannot now recollect, nor does he believe that he ever did, in any of the conversations of Professor Morse, either on board of the said ship, or elsewhere, hear the said Morse acknowledge himself to be unacquainted with electro-magnetism, or that he was informed of the particulars of his discovery by any person on board of the packet ship Sully; that during that passage he did not hear, nor did he understand, that any other person on board of the said ship, except said Morse, pretended to claim to have made said discovery; that in the repeated discussions on scientific subjects which took place on board of the said ship among the passengers, Professor Morse took an active part, and appeared familiar with the varied subjects of discussion, among which *was* that of electro-magnetism was a prominent one, and that he removed the various objections made to the application of this science to the purposes of telegraphing, and spoke at almost every meal at the table of his invention in the presence of the various passengers present; among whom were the Hon. Wm. C. Rives, T. F. Fisher, Doctor Chas. T. Jackson, C. C. Palmer, esq., and others, neither of whom, to my knowledge, made any claim in regard to the matter as being the inventor, or as having any part in it, or as taking any such part or prominence in the said discussions as would mark him out as a participator in the invention. He always has believed, and still does believe, that Professor Morse was the first person, and the only person, on board of the packet ship Sully who suggested the idea of an electric telegraph, and that he alone, among

the passengers, brought it to its maturity. The deponent has no recollection that Professor Morse ever did, on board of the packet ship Sully, make the inquiry of any one in regard to what electro-magnetism was; deponent has read the printed article now produced, and made an exhibit, marked in red ink "X," and also having in red ink "January 10, 1829," and which is annexed to this his deposition; that, in reference thereto, he does not know, and cannot prove the matters therein stated, in which reference is had to deponent, nor does he recollect the matters therein stated to be "in his recollection." Deponent further answers or says, he does not know, nor can he set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause.

WM. W. PELL.

Sworn this 10th day of September, 1849, before me.

C. S. WOODHULL, *Mayor.*

The following are the letters and printed article referred to and filed with the foregoing deposition, to wit:

E.

NEW YORK, *February* 1, 1838.

SAM. F. B. MORSE, esq.

DEAR SIR: It is a matter of great astonishment to me that a fellow-passenger with us in the Sully, from Havre, in October, 1832, should attempt to contend with you the claim of having been the inventor of the electric telegraph, which occupied so much of your attention during the passage, or that there was one on board of her who had any claim even to a participation of its honors. To your query on that subject I can only reply in general terms, as I have not a distinct recollection of all the conversations and circumstances bearing upon it which then came to my knowledge; but any impressions rest upon my mind with the freshness and force of conviction, that you only on board of that ship was the originator of the invention; that your mind alone seemed interested in it with any seriousness of purpose, even after its suggestion by you, and while *while* it was, in seeming, the daily and favorite object of your study, which was each day developing it into higher perfection; so, when a few days since I examined your instrument, I recognised in it the principles and mechanical arrangements which on board I had heard you so frequently explain through all its developments. With the sincere wish that no hand may be so rash as to persist in the attempt to snatch from you the reward which belongs to you,

I subscribe myself, with much esteem,

WM. W. PELL.

SAMUEL F. B. MORSE, esq.,
Professor at the University, New York.

I, Caleb S. Woodhull, mayor of the city of New York, do certify that the above and within letter was produced, and made an exhibit, before me on the taking of the deposition of William W. Pell, under and *and* pursuant to the commission and interrogatories hereunto annexed, and the same was then and there marked as an exhibit, and annexed to said deposition.

In witness whereof I have hereunto set my hand, and affixed my official seal, this 11th day of September, A. D. 1849.

[L. S.]

CALEB S. WOODHULL.

NEW YORK, *Sept.* 27, 1837.

SAM'L F. B. MORSE, esq.

DEAR SIR: On my arrival here I received your letter calling upon my recollection for what was said on the subject of an electric telegraph, during the passage from Havre, on board of the ship Sully, in Oct., 1832. I am happy to say I have a distinct remembrance of your suggesting, as a thought newly recurred to you, the possibility of a telegraphic communication being effected by electric wires. As the passage progressed, and your idea developed itself, your idea became frequently a subject of conversation; difficulty after difficulty was suggested, as obstacles to its operation, which your ingenuity still labored to remove; until your invention, passing from its first crude state, through different grades of perfectionment, was, in seeming, matured to an available instrument, wanting only patronage to perfect it and call it into reality; and I sincerely trust that circumstances may not deprive you of the reward due to the invention, which, whatever may be its source in Europe, is, with you at least, I am convinced, original. To your question of my having spoken on subsequent passages to others of your invention, I might say, you could well anticipate the reply, as you enjoined no secresy on me. It was natural I should mention a subject so interesting to me, and have a remembrance of so doing in several instances, but to whom I cannot recollect. When you observed to me, a few days before leaving the ship, "Well, Capt., when you hear of the telegraph one of these days as the wonder of the world, remember the discovery was made on board the good ship Sully." I then little thought I should ever be called upon to throw into the scale my mite of testimony in support of your claim to priority of invention for what seemed so startling a novelty.

With my best respects, and best wishes, I subscribe myself,

WM. W. PELL.

TO SAM'L F. B. MORSE, esq.,

New York.

I, Caleb S. Woodhull, mayor of the city of New York, do certify, that the above and within letter was produced and made an exhibit before me, on the taking of the deposition of William W. Pell, under and pursuant to the commission and interrogatories hereunto annexed, and

the same was then and there marked as an exhibit, and annexed to said deposition.

In witness whereof I have hereunto set my hand and affixed my official seal this 11th day of September, 1849.

[L. S.]

CALEB S. WOODHULL.

Printed article, exhibit X.

THE OBSERVER.

NEW YORK, *Saturday, February* 2, 1839.

X. *From the Boston Post, January* 10, 1839.

Electro-magnetic Telegraph. We are informed that the invention of the Electro-magnetic Telegraph, which has been claimed by Mr. S. F. B. Morse, of New York, is entirely due to our fellow-citizen Dr. Charles T. Jackson, who first conceived the idea of such an instrument during his return voyage from Europe in the packet-ship Sully, in October, 1832.

Mr. Morse being his fellow-passenger, and having pretended to feel a great interest in the invention, and a desire to participate in the experimental trials of the machinery, Dr. Jackson freely communicated to him, and to all the cabin passengers, his various plans for effecting the telegraphic communications.

Subsequently Mr. Morse undertook to monopolize the credit of the invention, when Dr. J. wrote to him a friendly remonstrance, to which he received a long sophistical reply, of a very unsatisfactory character. This was followed by a severe reprimand from Dr. J., with a detail of all the circumstances of the invention, and of the conversation which took place on board the Sully, when an impudent answer was returned, giving Dr. J. to understand that Mr. Morse had taken out a patent for the invention, and was the only inventor acknowledged by the law, and cautioning him as to his proceedings. In the mean time Mr. Morse was informed that if he pretended to publish an account of the instrument in the American Journal of Science, as he had attempted, that a disclaimer would follow it; whereupon he withdrew his article. The origin of the idea of the new telegraph, as above stated, can be proved by a number of the passengers on board the Sully at the time, and Mr. Rives, the American ambassador to France, Mr. Fisher, of Philadelphia, and Capt. Pell, of the Sully, having listened to the conversation, will recollect that Mr. Morse acknowledged himself wholly unacquainted with electro-magnetism, and that Dr. J. freely informed him of every particular discovery applicable to the case."

I, Caleb S. Woodhull, mayor of the city New York, do certify that the above printed article, headed "The Observer," and marked in red ink "X," "January 10, 1839," was produced and made an exhibited before me by William W. Pell, upon the taking of his deposi-

tion, under and pursuant to the commission and interrogatories hereunto annexed, and the same was by said Pell then and there annexed to his said deposition in my presence.

In witness whereof I have hereunto set my hand and affixed my official seal, this 11th day of September, A. D. 1849.

[L. S.]

CALEB S. WOODHULL.

The following is a letter referred to in the deposition of Sidney E. Morse:

Letter—B. Silliman to S. E. Morse.

NEW HAVEN, *January* 31, 1839.

MY DEAR SIR: Your brother's communication of last spring on his claims to the discovery of the electro-magnetic telegraph was withdrawn at my request for the reasons you have stated.

As I am equally in friendly communication with both parties, I should prefer not to appear directly in the affair, but you can express your belief which, should Dr. Jackson appeal to me, I will confirm; at the same time I can readily believe that Dr. Jackson might suppose your brother to be influenced by the statement of his (Dr. Jackson's) claims.

I remain, my dear sir, as ever, yours, truly,

B. SILLIMAN.

S. E. MORSE, esq.

I, Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of said city, do certify, that the within letter of B. Silliman was produced and made an exhibit before me on taking the deposition of Sidney E. Morse, which is hereunto annexed, and the same was then and there in my presence marked as an exhibit.

In witness whereof I have hereunto set my hand and affixed my official seal, this 28th day of September, 1849.

[L. S.]

CALEB S. WOODHULL,

Mayor of the city of N. York and chief magistrate of said city.

(Deposition of Sidney E. Morse, taken under the interrogatories copied herein on page 557, to wit:)

Deposition of S. E. Morse.

Deposition of Sidney E. Morse, of the city of New York, taken under and pursuant to the commission and interrogatories hereunto annexed, before Caleb S. Woodhull, mayor of the city of New York and chief magistrate of said city, at the office of said mayor in the city and county of New York, on the 28th day of September, 1849, to be read in a certain cause depending in the circuit court of the United States, for the 8th circuit, district of Kentucky, Frankfort, wherein Samuel F. B. Morse, Alfred Vail, and F. O. J. Smith, are complainants in chancery, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hast-

ings, are defendants. The said deponent being first carefully examined, and cautioned, and sworn to tell the whole truth, doth depose and say as follows:

In answer to the interrogatories annexed to the commission in this cause from the first to the 59th, both inclusive, he says: He was heretofore examined under a commission in this cause before Wm. S. Havemeyer, late mayor of the city of New York; that at such examination he fully and truly stated all that he knew or could depose and say, and all that he now knows or can depose and say, in reference to the several matters about which he is interrogated in and by said several interrogatories above named; that deponent has been informed and believes that his deposition under the former commission has been filed with the clerk of the circuit court of the United States, at Frankfort, for the 8th circuit, Kentucky district; that deponent would refer to the said deposition as containing full, just, and true answers to the said several interrogatories above named.

In answer to the sixtieth interrogatory deponent says: That at the time of answering said interrogatory under the former commission, he did not then know, nor did he then believe, that the matters he is about now to state could be or were material to the parties in this cause or either of them, or to the issue in this cause; but that he, deponent, has since learned that they may be so. Deponent now, in further answer to said 60th interrogatory, further says, that a brief description of Morse's telegraph was given in the American Journal of Science, and a more full account was proposed to be subsequently published in that journal, and one was prepared for that journal, by Samuel F. B. Morse; that deponent was informed that Dr. Jackson wrote to Professor Silliman and claimed a right to reply if that article was published; that Professor Silliman, as deponent learned from him, being unwilling to have his Journal of Science occupied with an unprofitable controversy between two of his friends, urgently requested Samuel F. B. Morse to withdraw his article, and the same was withdrawn at the earnest request of Professor Silliman, but with much reluctance on the part of my said brother. The letter now produced, and upon which I have written my name and the date of the taking of this deposition, is in the handwriting of Professor B. Silliman, of New Haven, which was received by deponent on or about the 21st of January, A. D. 1839, and that said letter refers to the article thus withdrawn, of my brother, as above stated, and that the reasons deponent stated to Professor Silliman for its withdrawal are the same as deponent has stated in this deposition, and said reasons are those referred to in said letter from Professor Silliman; that said Silliman was at the time that said article was sent for publication, and at the time it was withdrawn, an associate editor of said Journal of Science; that deponent, from what he heard his brother, S. F. B. Morse, say at the time, and of what he knows respecting the circumstances under which it was withdrawn, verily believes that his brother, in its withdrawal, was actuated by a desire to conform to the wishes of Professor Silliman, and that the same

was not withdrawn out of any fear of any reply or claim that might be presented for publication by Dr. Jackson.

SIDNEY E. MORSE.

Sworn before me this 28th day of September, 1849.

C. S. WOODHULL, *Mayor.*

STATE OF NEW YORK,
City and county of New York, ss.

I, Caleb S. Woodhull, mayor of the city of New York, and chief magistrate thereof, in due form of law commissioned and lawfully acting as such, do hereby certify, that the foregoing deposition of Sidney E. Morse was taken before me at the mayor's office in the city of New York, under and pursuant to the annexed commission and interrogatories, and at the date hereof; that said deponent was first cautioned, examined, and sworn upon the holy evangelist of Almighty God to testify to the whole truth; that said deponent did, with his own hand and in my presence, reduce his deposition to writing, and did then and there in my presence subscribe the same; that said exhibit annexed to said deposition was then and there produced before me, and made an exhibit in said cause, and is the identical exhibit referred to in said deposition. That I am not of counsel or attorney for either of the parties, or interested in the event of said cause; all of which is certified to the said court and the cause wherefore the same are taken, and for the manner it is done.

In witness whereof I have hereunto set my hand, and affixed my official seal, this 28th day of September, 1849.

[L. S.]

CALEB S. WOODHULL,
Mayor of the city of New York and chief magistrate of said city.

UNITED STATES OF AMERICA,
Southern district of New York, ss:

I, James W. Metcalfe, clerk of the district court of the United States of America, for the southern district of New York, do hereby certify, that I am well acquainted with the handwriting of Caleb S. Woodhull, whose name is subscribed to the annexed certificate, and that the signature to the same is in his proper handwriting. And I do further certify, that he was, at the time of signing the same, mayor of the city of New York, and chief magistrate of the said city of New York, for the southern district of New York.

In testimony whereof I have hereunto subscribed my name, and affixed the seal of the said district court, this twenty-ninth day of September, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of these United States the seventy-fourth.

[L. S.]

J. W. METCALF, *Clerk.*

STATE OF NEW YORK,
City and county of New York, ss.

I, Caleb S. Woodhull, mayor of the city of New York, and chief magistrate thereof, in due form of law commissioned and lawfully acting as such, do hereby certify, that the foregoing depositions of James Renwick, John Torrey, James R. Chilton, William W. Pell, and Robert Rankin, were taken before me at the mayor's office, in the city of New York, under and pursuant to the annexed commission and interrogatories, at the respective dates I have fixed at the foot of each of said depositions respectively that each of said deponents were first duly sworn upon the holy evangelists of Almighty God to testify to the whole truth; that the said deponents did, each respectively, with his own hand and in my presence, reduce his deposition to writing, and did then and there in my presence subscribe the same. That each and every of the exhibits, which are annexed to said depositions respectively, were then and there produced before me, and made exhibits in the said cause, and are the identical exhibits to which the deponents respectively refer in their said depositions. That I am not counsel or attorney for either of the parties, or interested in the event of said cause; all of which is certified to the said court, and the cause wherefore the same are taken, and for the manner it is done.

In witness whereof I have hereunto set my hand, and affixed my official seal, this 15th day of September, A. D. 1849.

[L. S.] CALEB S. WOODHULL,
Mayor of the city of New York.

UNITED STATES OF AMERICA,
Southern district of New York, ss.

I, James W. Metcalf, clerk of the district court of the United States of America, for the southern district of New York, do hereby certify, that I am well acquainted with the handwriting of Caleb S. Woodhull, whose name is subscribed to the annexed certificate, and that the signature to the same is in his proper handwriting. And I do further certify, that he was at the time of signing the same mayor of the city of New York, and chief magistrate of the city of New York, in the southern district of New York.

In testimony whereof I have hereunto subscribed my name, and affixed the seal of the said district court, this twenty-ninth day of September, in the year of our Lord one thousand eight [L. S.] hundred and forty-nine, and of the independence of these United States the seventy-fourth.

J. W. METCALF, *Clerk.*

Deposition of J. Walter.

(Deposition of Jacob Walter, taken under the same interrogatories copied herein on page 557, to wit:)

The deposition of Jacob Walter, taken for the purpose of being read

in the case of Morse and others against O'Rielly and others, now pending in the circuit court of the United States, for the eighth circuit and Kentucky district, by authority of the annexed commission, on the interrogatories thereunto annexed, and herein referred to by number; on the 19th day of May, 1849, at my office in the city of Louisville, State, district, and circuit aforesaid. The deponent being of lawful age, personally known (to me,) the undersigned, produced on behalf of complainants, and solemnly cautioned and sworn to state the whole truth, and to make true and perfect answers to the several questions propounded to him in this case, and having been duly examined, doth depose and say:

Interrogatory No. 1 being read to said witness he answers: From the best information I have, I am fifty-seven years old past, advancing to fifty-eight; *a* a native born citizen of the United States, and resident of the city of Louisville, Kentucky; and by profession a mechanic.

Interrogatory No. 2 being read to him he answers: I am acquainted with said invention. In 1846, I visited the city of Washington, at which time I visited the Telegraph office; I found those in attendance kind and communicative, indulging me in all I desired; I then made a sort of inspection of the telegraphic apparatus, and experimented through the telegraph instrument by questions put to Baltimore, Philadelphia, &c., to all of which questions I received immediate answers, which to me was highly satisfactory, in relation to the importance and perfection of this great discovery; previous to this, I had only met with transient accounts of its performance. I have been engaged as a general experimenter in the science of electro-magnetism for the last thirty years; the last ten years of my life have been almost entirely devoted to the science.

Interrogatory No. 3 being [read] to witness he answers: It was by printing signs at a distance, through the power and agency of electro-magnetism, through a continuation of mechanism.

Interrogatory No. 4 being read to witness he answers: Prof. Morse did not directly or indirectly describe to me any apparatus of a telegraph; I never have seen him; all that I have learned in that way was from written documents from various sources, and from explanations made at the time I visited the Telegraph at Washington in 1846, as above stated.

Interrogatory No. 5 being read to witness he answers: Prof. Morse never did show me any machine in operation.

Interrogatory No. 6 being read to witness he answers: I annex hereto a drawing, marked "plate No. 2, Morse's telegraph," with a written description thereof attached upon the face of said drawing; that description I make along with said drawing part of this deposition, marked with the initials of my name, (J. W. No. 1,) and say the same is correct, and describes the instrument which I examined, and on which I operated in Washington aforesaid in 1846, and which was Morse's instrument.

Interrogatory No. 7 being read to witness he answers: I don't know anything about this question.

Interrogatory No. 8 being read to witness he answers: Prof. Morse used for imprinting signals two combinations of circuits, in connexion with a receiving magnet, or its equivalent. A circuit is a continuous connexion by a good conductor between and uniting the two poles of a battery, or any generator of electricity.

Interrogatory No. 9 being read to him he answers: I know nothing about his invention beyond the date of his patent.

Interrogatory No. 10 being read to him witness answers: I have read the patent of said Morse issued 13th June, 1848, being second issue of the patent of the 20th June, 1840, with specifications thereto annexed. I state that the said specifications, with the drawings referred to and accompanying the same, show the invention in a light so clear that I could thereby construct the apparatus and use the same.

Interrogatory No. 11 being read to him witness answers: I give it as my opinion, that any scientific mechanic, acquainted with the science to which this invention appertains, could construct and put Morse's apparatus into operation, from the specifications and drawings annexed to said letters patent.

Interrogatories Nos. 12 and 13 being read to him witness answers: I give the same answer to these two questions that I have given above to questions Nos. 10 and 11.

Interrogatory No. 14 being read to him witness answers: It is my opinion that the specifications annexed to the patent issued 13th June, 1848, reclaiming patent of 11th April, 1846, does clearly and sufficiently show in what said improvement consists. I confess that I am not sufficiently acquainted with elder patents, if any have issued to others, to say how far Morse's patent differs from them, but the junior patent to Morse does show what is new in it from what is old in its predecessors.

Interrogatory No. 15 being read to him witness answers: I don't know precisely when the O'Rielly Nashville line was begun, or when finished. In February, 1848, I was called on by the managers of the line to touch up some magnets, and to make some alterations in the instruments; I knew no one by name, but talked freely with all about the office. It was called the O'Rielly line; it was then in progress; some called it the "People's line."

Interrogatories Nos. 16, 17, 18, 18, 19, 20, being read to him witness answers: I am not acquainted with the mode in which the defendants put and kept their said line in operation. The terminus of their line, and their office in Louisville, is on the southeast corner of Market and Third streets; I have visited it often, but the first time I did so was as before stated, in February, 1848, as shown by my account book.

The instrument claimed by Barnes & Zook I have examined. I annex a drawing thereof marked with my initials, (J. W. No. 2,) with explanatory notes attached on the face of it, and refer to those notes

and the drawing for the description required in this question; on both the drawings hereunto annexed, battery No. 5 is on the reverse side in black lead lines. This invention is called the Columbian telegraph, and said to be the invention of Barnes & Zook.

Interrogatory No. 21 being read to him witness answers: I have never visited the Nashville end of the O'Rielly or Peoples' line, and never saw the instrument in use there.

Interrogatories No. 22, 23, 24, 25, 26, being read to him witness answers: I refer to my answers to the foregoing questions for my answer to these, and for the drawings and notes upon them here *here* required, upon which I place 19th May, 1849, the date of giving this deposition. I further state that it is my opinion that the essential principles of the instrument of Barnes and Zook are the same as those of Morse's instrument. I was not present at court when the injunction herein was obtained.

Interrogatory No. 27, 28, being read to him deponent answers: The principle of the two instruments and the result they produce are essentially the same. There are formal differences between the instruments, but no essential difference or difference in principle. On looking at the drawings made part hereof, the Columbian instrument operates by compound magnets made of steel in conjunction with electro-magnets. While Morse uses the electro-magnet throughout. Morse's moves beautifully on a centre, while the Columbian has a sliding motion.

Interrogatories No. 29, 30, being read to him deponent answers: It is my opinion that the essential principles of Morse's instrument as patented are involved in that of Barnes and Zook. It is my opinion that the instrument of Barnes and Zook, so far as it differs in form and in the motion of the parts, is not an improvement on that of Morse. I think the contrary; I think that the instrument of Morse is the best decidedly.

Interrogatory No. 31, 32, being read to him deponent answers: I refer to the notes on the drawings to point out the difference in the registering of the two instruments, and also their resemblances.

Interrogatories No. 33, 34, being read to witness he answers: I state that, according to my conception, the mutator and receiving magnet are the same in both instruments. The mutator is used to stop the current or change the poles. The receiving magnet is the depository of power, and the register is simply the mark maker of the instrument, and is the use or end of the construction.

Interrogatories No. 35, 36, 37, being read to him deponent answers: The object of combining the register and receiving magnet in the one case, and the register and mutator in the other, is the same. The power of electro-magnetism is essential to put either of said instruments in motion. The permanent magnets of the Columbian are not essential to attain the end of marking characters at a distance, inasmuch as I have before stated Morse's instrument is worked wholly to the same end by electro-magnetism.

Interrogatories No. 38, 39, 40, 41, 42, 43, 44, 45, being read to witness he answers: A spring would fully substitute one of the permanent magnets of the Columbian instrument, and a piece of soft iron the other. As I said in my answer to thirty-one, the advantage is in favor of the armature; it is less inert, and moves with less weight and freer than the magnet. The mutator and receiving magnet do accomplish the same result by precisely the same means. It is hardly necessary to say that less force is required to move a small than a large weight; it is obvious. All complication is an injury in machinery; the beauty of every utility is its simplicity. If one item of any one kind be sufficient to produce the desired end, two are too much; so of the resident circuits. The second circuit of the mutator (as stated in question 43) is only an equivalent of the spring in the receiving magnet. I answer No. 44 affirmatively; there is both attraction and repulsion. When properly connected with the poles of the battery, the spring and soft iron (as proposed in the question) (the soft iron made thereby an electro-magnet) will produce the same effects of attraction and repulsion as the permanent magnets; and I think, capacity considered, will give the effects in equal degree.

Interrogatories Nos. 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, being read to witness he answers: The power to mark is sought in both instruments. I think Morse's capable of being raised to any required power to that end. To this end I think Morse's instrument has the advantage over the Columbian, I think greatly. As the permanent magnets are not capable of mutation, they are a less convenient method of applying the electro-magnetic power.

The permanent magnet, called the steel magnet, is made magnetic when the process of induction is applied. This is effected, 1st, by manipulating or rubbing an intended magnet or piece of steel against a magnet already made. 2d. By bringing a piece of steel in contact with the poles of an electro-magnet. 3d. By bringing the piece of steel in the circuit of a common galvanic battery, which circuit is composed of insulated copper wire.

The electro-magnet is made or magnetized by placing a piece of soft iron within a helix composed of insulated copper wire, which wire is connected to the poles of a common galvanic battery, and the battery set in motion.

The magnetic power or force of the steel magnet and that of the electro-magnet differs in degree of strength. The electro-magnetic force is greater. The electro-magnet depends upon the galvanic battery for a continual supply, while the steel magnet can use only the quantity infused into it, or fixed there; and its power, therefore, depends on the size of the piece of steel used, and its prepared state to receive and retain the fluid. Soft iron wont do. It must be steel tempered to the purpose, and of the best quality. The great preference of the electro-magnet is that its power of action may be increased, diminished or entirely cease at pleasure, while the power of the fixed magnet remains always at the same strength.

It is my opinion that it is settled among scientific men that the attraction and repulsion of magnets are powers of the same force operating in different directions; like magnets or magnetic poles repel, and unlike attract.

The phrase "motive power" among scientific men defines any agent that imparts action or motion to inertia, or to a body at rest. Inertia will be the result of placing a piece of soft iron between two horse-shoe magnets of equal force.

I think the forces of attraction and repulsion are equal. It requires more complicated machinery to bring these forces to act together than is required to make one of them available, if their forces could be united at all.

Interrogatories No. 57, 58, 59, 60, being read to him he answers: It is by the attractive force that the receiving magnet and register are worked in Morse's telegraph. This force does give sufficient power for the purpose of making signs for telegraphic purposes. I have said before that the power of Morse's instrument may be increased to any required extend for the purpose intended, and no greater complication of the machinery is necessary; nor is it necessary for its greater effeciency to bring the repulsive in aid of the attractive force.

I have said before that all complication of machinery, unnecessary to apply the principle efficiently, [is] injurious.

I know nothing material further in the premises, unless it might be proper to state, that in making repairs and alterations in the Columbian instrument, the whole thing presented to my mind a series of experiments; nothing fixed, nothing settled and determined about it; some of the removed parts of it are in my shop now, wholly useless; it was not permitted to the inspection of all observers. My opinion is, that it substitutes complication for discovery, and cumbrous and inconvenient motion for improvement, particularly in "the fixed magnets;" this appears to me to be the vice of the whole thing, and must be the cause of its ultimate failure and abandonment. No motion has ever been produced, to my knowledge, by fixed magnets alone. Electro-magnets must impart motion; and if, as in Morse's instrument, electro-magnets produce the utility desired, the addition of fixed magnets, as in the Columbian, retards rather than gives energy to the forces.

And further saith not

J. WALTER.

UNITED STATES OF AMERICA,
State of Kentucky, 8th circuit, Kentucky district, ss:

I, William S. Pilcher, commissioner of the United States in and for the said circuit and district, duly commissioned and so acting, certify, that the above named witness, Jacob Walter, having been by me solemnly cautioned, sworn, and examined, did, at the time and place stated in the caption, depose and give the above answers, and no more, to the several interrogatories so propounded to him; and that the evidence so given having been wholly reduced to writing by me in the presence of

said witness, and carefully read over to him, was subscribed by him in my presence; and that I am not of kin or of counsel to either of the parties, or in any way interested in the controversy.

Given under my hand this 19th day of May, 1849, at my office in the city of Louisville, the time and place mentioned in the caption.

W. S. PILCHER, *Commissioner.*

Deposition of Tho. C. McAfee.

(Deposition of Thomas C. McAfee, taken under the same interrogatories copied herein on page 557, to wit:)

The deposition of Thomas C. McAfee, taken to be read in the case of Samuel F. B. Morse, &c., against Henry O'Rielly and others, defendants, now pending in the United States circuit court, for the 8th circuit and Kentucky district, by authority of the annexed commission, addressed to me, W. S. Pilcher, commissioner in and for said district, on the interrogatories thereto annexed, and herein transcribed, on the 25th day of September, 1849, at the office of the said commissioner in the city of Louisville, in the State of Kentucky.

Deponent being of lawful age, personally known to me, the said William S. Pilcher, the commissioner aforesaid, and solemnly cautioned and sworn to state the truth, and to make true and perfect answers to the several interrogatories propounded to him in this case, and having been duly examined, deposes and states, in answer to complainants' interrogatories as follows:

Interrogatory No. 1. What is your age, profession, and residence?

Answer by deponent. My age is 31 years; my profession at present is that of a practical telegraphist; my residence is at present on the line of Morse's telegraph from Nashville to St. Louis, via Paduca, superintending the erection of that line

Interrogatory No. 2. Are you acquainted with the invention called Morse's Electro-magnetic Telegraph; if yea, state when, where, and under what circumstances you became acquainted with it.

Deponent answers: I am acquainted with the instrument spoken of in the question. I became acquainted with it in the office of complainant in Louisville first in March, 1848; I operated on it in that month and up to January, 1849, for complainants, and ever since have been acquainted with it by observation, reflection, and practical operation on it; before that time my acquaintance with the invention was general, not exact, derived mainly from the public newspapers.

Interrogatory No. 3. How did Professor S. F. B. Morse propose to communicate intelligence at a distance; was it by evanescent signs, or by imprinting the sign at a distance?

Deponent answers. Professor Morse, as I understood, did propose, and I know that by means of his invention, on which I have operated as aforesaid, does actually imprint signs at a distance by means of electricity.

Interrogatory No. 4. Did or not Prof. Morse describe to you any ap-

paratus or parts of apparatus of a telegraph? If yea, when and where did he do so?

Deponent answers. Prof. Morse did not at any time describe to me any such apparatus, in whole or in part.

Interrogatory No. 5. Did or not he ever show to you any apparatus or machine in operation; and if yea, when and where did he do so?

Deponent answers. Professor Morse never personally made any exhibition of machinery to me of any kind, at any time.

To interrogatories No. 6, 7, 8, 9, deponent answers that, as stated above, deponent got acquainted with the apparatus of Professor Morse in March, 1848; before that time he had no acquaintance with Professor Morse, nor with the history or progress of the invention, nor what he proposed as such. Deponent knows that the machine of Professor Morse, at Louisville, employs a single circuit or conductor. Deponent never saw any other mode of making signs at a distance proposed or claimed by Professor Morse, than the mode employed in the apparatus deponent has worked upon; deponent cannot delineate or describe the operation of the machine of Professor Morse, as shown to him by Professor Morse, as he never showed or described any to deponent. But deponent will describe said telegraphic apparatus, (by referring to and making the description given by deponent of it in deponent's affidavit herein made and filed with the application of complainants, on the motion made for an injunction against defendants, before the United States judge for the Kentucky district; and which affidavit will be again referred to in the subsequent part of this deposition,) as far as said affidavit purports to describe the same.

Interrogatory No. 10. Have you read the letters patent of the United States, issued to S. F. B. Morse on the 13th of June, 1848, for a new and useful improvement in the mode of communicating information by signals, by the application of electro-magnetism, (being the second reissue of the patent issued to said Morse originally, on the 20th day of June, 1840,) together with the specifications thereto annexed? If yea, state whether or not the said specifications, with the drawings referred to and accompanying the same, exhibit a description of the invention in such full, clear, and exact terms, as would enable you to construct and use the same.

Deponent answers. I have read the letters patent and the specifications referred to in this question, and think the specifications and drawings sufficiently clear to enable me to have it constructed and used.

Interrogatory No. 11. State whether or not, in your opinion, any person skilled in the art or science to which the said invention appertains, or with which it is most nearly connected, would be enabled, from the specifications and drawings annexed to the said letters patent, to construct and use said invention.

Deponent answers. I think any person (supposed by the question) would be enabled, from the specifications and drawings annexed to said patent, to construct and use said invention.

Interrogatory No. 12. Have you read the letters patent, issued to S.

F. B. Morse on the 13th June, 1848, for an improvement in electro-magnetic telegraph, (being a reissue of a patent issued to said Morse on the 11th of April, 1846,) with the specifications annexed thereto? If yea, state whether or not said specifications, with the drawings referred to and accompanying the same, exhibit a description of said patented improvement in such full and clear terms as would enable you to construct and use the same.

Deponent answers. My answer to this question is verbatim my answer to interrogatory No. 10.

Interrogatory No. 13. State whether or not, in your opinion, any person skilled in the art or science to which said patented improvement is most nearly connected, would be enabled, from said last named specifications and drawings, to construct and use the said improvement.

Deponent answers. I answer this question in the words of my answer to interrogatory No. 11.

Interrogatory No. 14. State whether or not, in your opinion, the said last named specification do clearly and sufficiently show in what said improvement consists, and distinguish what is new from what is old.

Deponent answers. In my opinion, the specifications referred to do clearly and sufficiently show in what said improvement consists, and do distinguish what is new from what is old.

Interrogatory No. 15. State what you may know respecting the erection of a line of telegraph by the defendant, Henry O'Rielly, and those employed by him, from Louisville, Kentucky, to Nashville, Tenn., when the same was built, what is the nature of said line, and what it was commonly called.

Deponent answers. In the early part of the year 1848, the deft., H. O'Rielly, constructed a line of telegraph from Louisville, Kentucky, to Nashville, Tennessee; the object of which was to send intelligence by means of electricity. This line of telegraph was called the "People's line." It was a single wire, placed on posts extending between said cities, and to each of them.

Interrogatory No. 16. State, in like manner, what you may know respecting the building of a line of telegraph, between the same points, by or for the complainants; when it was done, and the nature of the same; when it was put in operation, and whether it has continued to operate.

Deponent answers. At the same time that the so called "People's line" was being built, the complainants so also caused to be built a telegraph line between and to the same cities, which was put in operation about the month of June, 1848; and which has, since that time, been in use. It is also a single wire, placed on posts, similar to the "People's line" aforesaid.

Interrogatory No. 17. State what you may know respecting the mode in which the defendants put and kept their said line in operation, and all the circumstances attending the same.

Deponent answers: For answer to this question I make my affidavit, made in this cause in August, 1848, relating to the mode in which de-

fendants put and kept the said "People's line" in operation, my answer to this interrogatory, and part of this deposition.

Interrogatory No. 18. State the situation of the terminus and office of the defendants' said line in Louisville, and whether and when you visited the same.

Deponent answers: The terminus and office was in the building (S. E.) corner 3d and Market streets, Louisville, and I visited it at the time stated in my said affidavit before referred to.

Interrogatory No. 19. Describe the apparatus and machinery you observed in the said office, and annex a drawing or drawings of the same; and explain, as fully as you can, the mode of its operation.

Deponent answers: The drawings hereto annexed upon a sheet, upon the left hand upper corner of which I have written my name and the date of this deposition, and made part of this deposition, with the descriptions written on the same sheet. The plate No. 1, on the said sheet, represents the apparatus called the "Columbian Telegraph," claimed to have been invented by Barnes & Zook. The writing on the back of said plate describes the said apparatus, and its mode of operation. The figure (No. 1) represents substantially the "Columbian Telegraph," as it was shown before the district judge by the defendants, on the motion for an injunction in this case. The pen point being at the end of an arm, which extended from the electro-magnet S, moved on wheels or rails between the two permanent magnets T U and V W. The slip of paper was drawn by the two rollers A B over a fixed piece of brass or cylinder, C, on which was a groove, in which the indentations of the pen were made upon the paper. The alphabet used by the defendants in their office at Louisville was the same combination of dots and marks which was patented to Morse and used in Morse's office.

Interrogatory No. 20. What was the said apparatus called, and whose invention was it said to be?

Deponent answers: It was called the "Columbian Telegraph," and said to be the invention of Barnes & Zook.

Interrogatory No. 21. Have you at any time, and when, visited the office at the Nashville end of the line of the defendants; and if yea, describe the apparatus and machinery used in the said office for telegraphing as fully and clearly as you can, together with its mode of operation.

Deponent answers: In answer to this question I refer and make part hereof my affidavit made on the first day of June, 1849, before James Shannon, justice of the peace, Franklin county; which affidavit is filed and annexed hereto as part hereof.

Interrogatory No. 22. Were you present at the hearing (before his honor the district judge of Kentucky, in August and September, 1848) of the motion for an injunction in this case? If yea, state whether any instrument for telegraphing was exhibited on the part of the defendants; and if yea, what was it called, and *if* what in any respects

did it differ from the instrument in the office of the defendants at Louisville.

Deponent answers: I was present at the said hearing. The defendants did exhibit there the so called "Columbian" instrument, substantially delineated in figure 1, plate 1—the drawing hereto attached. It differed from the instrument I had seen in the defendant's office in Louisville in the particulars hereinafter stated.

Interrogatory No. 23. Are you acquainted with the instrument called Barnes & Zook's? If yea, state the extent of your knowledge upon this subject, and when, where, and how you acquired the same.

Deponent answers: I am acquainted with said instrument and its mode of operation. The extent of my knowledge upon the subject will appear from what I have already stated, as also how I acquired the same.

Interrogatory No. 24. Are you acquainted with the inventions patented to S. F. B. Morse by the United States? Have you read his patent issued on the 13th of June, 1848, and have you seen his said invention in operation?

Deponent answers: I am acquainted with Morse's patented inventions referred to. I have read his patent of the 13th of June, 1848, and have seen his invention in operation.

Interrogatory No. 25. Describe the telegraph of Morse, and that of Barnes & Zook, embracing the whole of each machine, with all its parts, from the main battery to the register, describing the functions of each part, and annex to your answers such drawings of both the instruments as may be useful to explain them and facilitate the understanding of your answers.

Deponent answers: For answer to this question I refer to the drawings and descriptions upon them already annexed to this deposition. Said drawings are substantially correct, as are also the descriptions upon the same.

Interrogatory No. 26. Examine the drawings now exhibited to you, marked drawings of "Barnes & Zook's telegraph, with the explanatory notes, and having written your name and the date of taking this deposition thereon, please to state upon such examination, or upon your knowledge of the instrument itself, from having seen the same, (naming which,) whether or not, in your opinion, the essential principles of the instrument of Barnes & Zook are the same as those of Morse's instrument.

Deponent answers: I am of opinion, from my knowledge of both the instruments, that the principle of that of Barnes & Zook is essentially the same with that of Morse.

Interrogatory No. 27. Do the instruments produce the same or different results upon the same or different principles?

Deponent answers: The instruments produce the same results on the same principles.

Interrogatory No. 28. If the instrument of Barnes & Zook differs,

in your opinion, from that of Morse, what is the nature of those differences, and do they affect the essential principles of the two?

Deponent answers: There is no difference between the two instruments, which, in my opinion, affects the essential principles common to both.

Interrogatory No. 29. State whether, in your opinion, the essential principle of Morse's instrument, as patented, are not involved in that of Barnes & Zook?

Deponent answers: It is my opinion that the essential principles of Morse's instrument, as patented, are involved in the instrument of Barnes & Zook.

Witness having nothing to say in answer to the questions herein, from 30 to 59, inclusive, they are not put to him; and, to this witness, they are waived by complainants.

Interrogatory No. 60. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

Deponent answers: That under this interrogatory further answering interrogatory No. 19, herein before transcribed, I state, that the machine which was used in the office of the defendant, O'Rielly, at Louisville, prior to the hearing of the motion for the injunction in this case, varied from that represented in fig. No. 1 on the drawing hereto attached, by having the electro-magnet S suspended at the lever end of a bent lever whose fulcrum was at A, and the pen point at the other end of the lever, making indentations upon the upper one of two rollers which was grooved, and over which the paper passed as represented by figure 2 on plate 1, aforesaid. When the defendants first commenced their operations they used, instead of the mutator represented in plate (1,) the needles described in affidavit of James F. Foss. The use of these needles was continued for a short time only, when they were substituted by the mutator represented in plate 1, which was used by the defendants at the time of the motion for the injunction, and for a considerable time previous thereto, and which was exhibited as part of the "Columbian Telegraph" on the hearing before the district judge. Plate 2, on said sheet or drawing aforesaid, is a representation of Morse's telegraph, a description of which is written on the back thereof; the operation of both is substantially described on the back thereof in said description.

I further state, in answer to this general interrogatory, that the defendant, O'Rielly, is a non-resident of Kentucky, and has not to this, my knowledge or belief, any property whatever in Kentucky, except interests in telegraph lines, (if now he has any such,) and which interests are wholly valueless except for telegraph purposes; and that he has nothing in the State out of which a judgment for damages could be satisfied, to the best of my knowledge, information, and belief. The defendants, Witman & Hastings, were transient persons in the employ-

ment of O'Rielly, and both and each without property in Kentucky, as I verily believe.

I further answer, and refer to and make part of this deposition, two affidavits made in this cause before W. S. Pilcher, commissioner, one on the 14th October, 1848, the other on the 31st of October, 1848, by me; the contents of which affidavits are true, and are now restated and affirmed by me, and copies thereof are hereto annexed.

Further answering I state that, in my opinion, the working of the O'Rielly line of telegraph, as well as the erection thereof, had been of great damage to the interests and line of complainants from Louisville to Nashville over the same route, and has greatly diminished the receipts of the complainants' line. I do not know the actual receipts upon either line, but I am well satisfied that telegraphing between those two cities, without competition, would be profitable—would yield well; and that stock in such a line would be in demand and valuable. I am informed and believe, that the line of complainants has never paid expenses of management.

I further state, that the cost of erecting complainants' line aforesaid was not less to them than $100 per mile. I have recently been superintending the construction of a line of telegraph between Nashville, in Tennessee, and St. Louis, in Missouri, via Paducah, Kentucky, which costs ($75) seventy-five dollars per mile, or thereabouts; and further saith not

THOMAS C. McAFEE.

UNITED STATES OF AMERICA,
State of Kentucky, 8th circuit, Ky. dist., ss:

I, William S. Pilcher, commissioner of the United States in and for the said circuit and district, and specially appointed by the annexed commission, to me directed, from the circuit court for the said circuit and district, certify, that the above named witness, Thomas C. McAfee, having been by me duly sworn, cautioned, and examined, did, at the time and place stated in the caption, depose and give the above answers, and no more, to the several interrogatories so propounded to him, and that the evidence so given having been wholly reduced to writing by me in the presence of said witness, and thereupon read by me to him, was so subscribed by him in my presence, and that I am not akin to, or of counsel of, either of the parties, or in anywise interested in the controversy.

Given under my hand, at my office in the city of Louisville, this 25th of September, 1849.

WILLIAM S. PILCHER, *Commissioner.*

The following is the affidavits of Thomas C. McAfee, referred to, to wit:

Affidavit of T. C. McAfee.

SAMUEL F. B. MORSE and others
vs.
HENRY O'RIELLY and others.

In equity, in the circuit court of the United States, for middle district of Tennessee.

This affiant states that he is about thirty-one years of age, and has been a practical operator in the office of Morse and his associates, in Louisville, Ky., upon the telegraph line from Maysville, by way of Louisville, to Nashville, Tennessee.

That he is now, and has been for some months past, engaged in erecting a telegraph line from Nashville, Tennessee, to Paducah, Kentucky.

That as an operator in the Louisville office aforesaid, he was in the habit of sending and receiving messages by telegraph, to and from Nashville and Memphis, by the way of Nashville, upon the line constructed under the auspices of Morse and his associates, there being a line so constructed from Louisville, by Nashville, to Waynsboro', in Tennessee, and thence to Memphis, in said State; upon which line there has been, and is yet used, the telegraphic apparatus invented and patented by S. F. B. Morse. That the said line is now, and has been for many months past, in active and regular operation as a telegraph line. That the defendant, Henry O'Rielly, has also constructed a line of telegraph from Louisville, by way of Nashville, to Tuscumbia, Alabama; and, as affiant is informed and believes, he has extended his line from Tuscumbia to the city of New Orleans. That the said O'Rielly has also caused to be constructed a branch line from Tuscumbia to Memphis, in Tennessee. That upon the line of said O'Rielly, from Louisville to Nashville, telegraphic operations were carried on between those two points by persons in the employ of said O'Rielly, until the same was stopped by injunction and proceedings in the circuit court of the United States for the district of Kentucky, during last fall; which operations are, in part, stated in an affidavit made by this affiant, on the 26th of August, 1848, before James Shannon, and which was read, on motion for the injunction aforesaid, in Kentucky; which affidavit is now before affiant, and is referred to and made a part of this affidavit. That in the month of March last affiant visited Nashville, in Tennessee, and was several times during that month and early in April in the telegraph office, in said city, of the defendant, O'Rielly, in which were employed in the business of telegraphing Eugene L. Witman and P. Peck. That affiant often examined the apparatus used in the said office for the purpose of receiving and transmitting intelligence; affiant is also acquainted with the apparatus invented and patented by Morse. Affiant refers to two drawings, one marked "Barnes and Zook," the other, "Morse;" upon each of which he has written his name and the date of this affidavit, and to the explanatory notes annexed to each of said drawings, and makes the said drawings and

notes parts of this affidavit. Affiant states that the said drawing, marked "Morse," delineates the substantial and essential parts of the apparatus invented and patented by Morse, as used upon the lines built under the auspices of the complainants; and affiant thinks the explanatory notes show the operation of the same. That the drawing marked "Barnes and Zook" correctly exhibits the substantial and essential parts of the apparatus used as aforesaid, and observed by affiant in the office aforesaid of the defendant's, in Nashville; and affiant thinks the explanatory notes annexed thereto correctly describe the said apparatus and its mode of operation; and, in the opinion of affiant, the substantial and essential parts in the last mentioned apparatus are the same as those invented by Morse, as described in the drawing marked "Morse." That the alphabet employed by said defendants, at their said office in Nashville, in the communication of intelligence, is the same as that used by the complainants in their office—that is to say, it consists of dots and short and long lines, impressed upon a fillet of paper, moved by clock work, between a revolving cylinder and a steel point, which is brought in contact with the paper, so as to make thereon the said dots and lines, by means of an electro-magnet; which electro-magnet, thus moving said steel point, and bringing it in contact with the paper, is made and unmade at the will of the operator, by passing a current of electricity from a main and local battery around bars of soft iron, through insulated wires coiled around the same, and connected with said batteries, and with the point to which the intelligence is to be transmitted. That the apparatus, by which this result is effected—namely, wires, batteries, keys, magnets, or registers, and clock work—are the same in substance, to all intents and purposes, in the office of the complainants at Nashville, and in the office of the defendants, at the same place. That the instrument used by the defendants, in said office at Nashville, to register intelligence transmitted to said office, is the same that has been styled by the defendants, "The Columbian Telegraph," purporting to have been invented by "Barnes & Zook," and as above stated substantially, to all intents and purposes, the same as that which is employed by the complainants in their office at Nashville, for the same purpose, and invented and patented by the complainants, S. F. B. Morse, known as "Morse's telegraph." Affiant further states, that in January last he visited the office of the defendant, O'Reilly, in Memphis, in Tennessee, from which the telegraph line, built by O'Reilly, proceeds, as above stated, to Tuscumbia, in Alabama, and observed that in said office the same "Columbian Telegraph" herein mentioned and described in the drawing annexed hereto, was used for the purpose of receiving and transmitting intelligence to Tuscumbia, and that the said office appeared to be in the constant employment of receiving and sending messages for rewards. H. S. Johnson was the operator in said office, who is known to affiant to be in the employment of Henry O'Rielly. Affiant is also acquainted with Ira Jones, and knows that he has been in the employment of the defendant, O'Rielly, as a telegraphic operator. Affiant has always un-

derstood and believes, that he is and has been, for some months past, the operator in the office at Columbia, upon the line of the defendants, from Nashville to Tuscumbia, in Alabama. Affiant was informed, in the office of the defendants, in Nashville, in March last, that said Jones was then the operator for O'Rilely in the office at Columbia.

Affiant further states that prior to the injunction obtained last fall in Kentucky, the defendant, O'Rielly, and his agents, were using in their office at Louisville, the "Columbian Telegraph," claimed to have been invented by Barnes and Zook. That upon the hearing of the motion for injunction before the district judge in Kentucky, the said "Columbian Telegraph" substantially as shown in the drawing marked "Barnes & Zook," made part hereof, was produced before the judge, and it was insisted by counsel of O'Rielly that the same was a distinct invention and not an infringement of Morse's patent; the contrary of which was decided by the district judge, and the use of the said "Columbian" was enjoined in the district of Kentucky.

Affiant further states that P. Peck, one of the defendants in this cause, is the same person who was one of the defendants in the Kentucky suit. He was at one time in the employ of the defendant, Henry O'Rielly, at Louisville, and is now, together with Witman and Jones, in his employment on his lines in Tennessee, as aforesaid, and that said O'Rielly, by his said agents and others, has been, and is now, transacting a general telegraphing business for reward upon his lines aforesaid, between Nashville and Tuscumbia, and between those two points and Memphis, by means of the said so-called "Columbian Telegraph."

Affiant is informed and believes, that the defendants, Peck, Witman, and Jones are transient persons in the employ and pay of the defendant, Henry O'Rielly, and have no visible property in the State of Tennessee, and are wholly irresponsible as affiant believes.

That the defendant, O'Rielly, is a non-resident of Tennessee, and has not, to this affiant's knowledge or belief, any property, real or personal in the State, except his interest in the telegraphic lines, which are wholly valueless except for telegraphing purposes, and that he has nothing in the State out of which a judgment for damages could be satisfied, to the best of affiant's knowledge, information, and belief.

THOMAS C. McAFEE.

Subscribed and sworn to, before me, this 1st day of June, 1849.

JAMES SHANNON, *J. P.*

The affidavit of Thomas C. McAfee, to wit:

UNITED STATES OF AMERICA,
8th circuit, Kentucky district, ss.

This day, Thomas C. McAfee came personally before me, at my office, in the city of Louisville, in said circuit and district, W. S. Pilcher, commissioner of affidavits, and duly commissioned and acting as

such, and made the following affidavit, to be read on the part of complainant in the suit pending in the 8th circuit and Kentucky district court, wherein S. F. B. Morse is complainant, and Henry O'Rielly and others are defendants, and both depose and say, on first being duly cautioned and sworn to tell the truth, the whole truth, and nothing but the truth.:

That he is and has been for several months employed in the office of Morse's telegraph in the city of Louisville, Ky., from which proceed the lines of telegraph to Frankfort, Ky., and to Nashville, Tennessee, as an operator on said lines. That in the same building is the office established by Henry O'Rielly, called the People's line office, in which were employed E. L. Witman and W. F. B. Hastings, upon the lines going from said office to Cincinnati and to Nashville, and in which, prior to the injunction granted by the district judge of Kentucky, there was used in the instrument called the Columbian Telegraph, and claimed to be the invention of Messrs. Barnes & Zook; affiant was often in said People's line office before the said injunction, and has been in it frequently since. That the said Columbian instrument continued to be used in the said office until the service of the writ of injunction in the case, Morse, &c., vs. O'Rielly, &c., when that part of it used for the making of marks upon paper was dispensed with, which part consisted of the clock work for moving the paper, the paper itself, and the pen point.

In other respects the instrument and the apparatus by which it was worked was left the same as it was exhibited to the judge on the hearing of the motion for the injunction. Affiant further states, that the said instrument and apparatus have continued to be used, and are yet used, for the purpose of sending and receiving messages upon the line constructed by the said O'Rielly, to and from Nashville, Tennessee.

No change having since been made in the apparatus for or in the mode of sending telegraphic messages on said line to Nashville, and the change in the mode of receiving messages from Nashville being in the dispensing with the marks upon the paper, the operator determining the messages by the sounds produced by the end of a moveable arm striking against a piece of brass permanently fixed. This arm is mounted upon a carriage fixed to or upon a piece of soft iron or electro-magnet, which plays between the two permanent magnets in the same manner as in the instrument shown on the aforesaid hearing before the district judge. The motion of the piece of soft iron or electro-magnet, is produced by the action of two local, or, as termed by Mr. Barnes, resident batteries, and circuits connected with the main line by the same mutator, which was exhibited on the hearing aforesaid; affiant further states, that E. S. Witman, who once operated in said office, has gone, as he is informed, to Nashville, and is now engaged in the office there. That E. F. Barnes, same who testified on the hearing aforesaid at Frankfort, and who claims to be one of the inventors of said Columbian Telegraph, commenced operating in the said office when the said injunction was served, and is yet operating therein in

sending and receiving messages to and from Nashville. Affiant has often conversed with said Barnes upon the subject of the injunction aforesaid, and said Barnes has repeatedly said to affiant that he had, since the injunction, sent and received messages to and from Nashville on said line of O'Rielly, as well as before the injunction; and said Barnes has often said that he had no difficulty whatever in receiving said messages by the sound, and that it was quite as good a method as that of the marks upon paper.

Affiant further states, that one Church, whose christian name is not remembered, is enaged in the said office of O'Rielly, in Louisville, and assists in the business of sending and receiving messages on the said line of O'Rielly to and from Nashville. Affiant verily believes that said Church and Barnes are both in the employment of said O'Rielly. He states that the said office and operations thereof are the same mentioned in the advertisement of the People's line to New Orleans and to Memphis, which was published in the Louisville Courier after the injunction.

Affiant further states, that several, he believes as many as half a dozen messages, have, since the service of the injunction, been brought to the office of Morse & Co., in which affiant, by the said Church, which purported to have been received at the said office of O'Rielly on the "People's line" from Nashville, or points beyond, for transmission upon Morse's line to Maysville, Kentucky, or to other points to which that line extends. Affiant annexes hereto, as part of his affidavit, three of the captions of said messages as received at said office of Morse to be transmitted, viz., two on the 1st Oct., 1848, and one on the 4th of October, 1848, on all of which he has written his name and place, the date of each upon the back thereof, as received at said Morse's office, and has pasted them together, and upon this sheet of his deposition, that the same may appear as part thereof. In each case of a message received from O'Rielly's office aforesaid, to be transmitted by that of Morse, when the pay for it was to be at the place to which it was directed, the operator of Morse paid the operator of O'Rielly's line for the cost of its transmission to Louisville by the latter line. And further saith not

THOS. C. McAFEE.

I, William S. Pilcher, commissioner aforesaid, certify, that the foregoing affidavit of Thomas C. McAfee was reduced to writing by me in his presence, on the 14th day of Octr., 1848, at my office in the city of Louisville; that said witness is of lawful age, that he is personally known to me; that he is a credible person; that he was duly sworn as stated in the caption, and that I am not of counsel or of kin to any one of the parties of the suit mentioned in the caption in which it is to be read, and that I have no interest whatever in the matters of this suit. Signed Oct. 14th, 1848.

W. S. PILCHER,
Comr. U. S., Ky. D., 8th circuit.

(Deposition of Edward N. Kent, taken under interrogatories copied herein on page 557, to wit:)

Deposition of E. N. Kent.

The deposition of Edward N. Kent, of the city of New York, taken before Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of the said city, at the office of the said mayor, in the city and county of New York, to be read as evidence in a certain suit depending in the circuit court of the United States, for the eighth circuit and Kentucky district, Frankfort, wherein Saml. F. B. Morse, Alfred Vail, and Francis O. J. Smith, are complainants in chancery, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings, are defendants.

The said deponent being first carefully examined, and cautioned, and sworn to tell the whole truth, doth depose and say, that he lives a greater distance from the said town of Frankfort than one hundred miles; furthermore he saith, he is aged thirty years; is by profession a practical chemist; that he is acquainted with the telegraph instruments patented by Professor Samuel F. B. Morse, and described in the specification and drawings annexed to said letters patent; that the letters patent, to which the deponent refers, is that of the United States, issued to S. F. B. Morse, on the 13th day of June, 1848, for a new and useful improvement in the mode of communicating information by signals by the application of electro-magnetism, being a second reissue of the patent issued to the said Morse on the 20th day of June, 1840; and also the letters patent issued to the said Morse on the 13th of June, 1848, for an improvement in electro-magnetic telegraphs, being a reissue of a patent issued to said Morse on the 11th of April, 1846; that he has constructed several of said instruments in the said letters patent and the specifications thereunto annexed and described; that he is acquainted with the mechanical form and mode of operation of the said instruments; that he has studied the sciences of electricity and electro-magnetism, and is familiar with the principles involved in said sciences; that he has made many experiments himself in the application and illustration of these sciences; that he has seen the drawing of an instrument said to be Barnes and Zook's telegraph, and to have been invented by Barnes and Zook; and, after examining the same, has made himself acquainted with its mode of operation; that the drawing, to which deponent now refers, is annexed to this deposition, and upon which he has written his name and the date of the taking of this deposition.

Deponent states, that plate 1 represents Barnes and Zook's instrument, called the Columbian; and plate 2 represents Prof. Morse's instrument; and deponent further states, that, on a careful examination and comparison of the two instruments, I find there is a main battery to each; a corresponding or writing key to each; a main line to each; a receiving magnet to each, both having the same object, though modified in form but not in principle; local batteries to each, having the same office to perform; and a pen lever worked by electro-magnetism

in each; and without electro-magnetism neither instrument would operate. In Barnes and Zook's instrument the pen lever moves by sliding forward and back, and in Morse's instrument by working on a pivot; the electro-motive power in one case being attached to the armature, and in the other case to the magnet. In both cases the motion is governed by the same laws.

I have made one of Morse's instruments, with a sliding armature moving to a fixed magnet, long before I had ever seen Barnes and Zook's drawing, but discontinued the manufacture of that form, having satisfied myself that it was no better, if as good, as the original form shown in the drawing of Prof. Morse's instrument attached to this deposition. The prominent steel magnet in Barnes and Zook's instrument appears to me to be useless; for an armature, when charged with electricity by means of a current passed through a coil of wire wound upon it, becomes an electro-magnet, and moves towards a piece of soft iron with the same facility as to a steel magnet; and if this soft iron has the form of a horse-shoe, the end which comes in contact with the north pole of the magnet becomes south, and the end which comes in contact with the south pole becomes north; and when the current of electricity, passing through the coil, is broken, a spring would separate the magnetized armature as well as another horse-shoe magnetized by means of a reversed current of electricity, by which the poles of the magnet become charged; and, in this particular, Morse's arrangement appears to be a decided advantage over that of Barnes and Zook's in point of simplicity.

Deponent further saith, that, in his opinion, the essential principles in Barnes and Zook's instrument are precisely the same as in Morse's, and that both produce the same results and upon the same principles; and the essential principles of Morse's instrument, as patented, is involved in that of Barnes and Zook.

Deponent further saith, that he is the owner of a work entitled "Chemical Manipulation; being instruction to students in chemistry on the method of performing experiments of demonstration or of research with accuracy and success: By Michael Farrady, F. R. S. M. R. I., &c. First American from the London edition, by J. R. Mitchell, M. D., Lecturer on Chemical Chemistry in the Philadelphia Medical Institute, Philadelphia. Published by Carey & Lee, 1831."

From page 479 of this work I make an accurate copy of the following paragraph, to wit:

"1046. The methods of subjecting substances to poles of the battery, for the purpose of effecting their decomposition and of collecting the results, are very numerous. If the substance be a fluid, for example, water or a saline solution, it may be put into a glass, and the two platina poles (1037) immersed in it; the nearer they are brought to each other, the more powerful will be the action. Tubes will answer the same purpose; they may be prepared very conveniently for such experiments by closing one end, but with a platinum wire passed through it, extending nearly to the other end. This may be done by passing the wire through a cork, and using that cork to close the tube; or by sealing the

platinum wire into the tube, and at the same time closing its extremity in the manner to be described in section xix, (1201.) Such a tube being fixed on a cork, (67,) with its open end uppermost, may be filled with the fluid; and, thus, if one pole be brought into contact with the other external end of the tube wire, and the other pole immersed in the fluid, action immediately commences.

In all these arrangements it is necessary that, however near the polls may approach each other, they should not be in contact, for then all chemical action on the surrounded fluid ceases.

And deponent further saith, that he does not know, and cannot set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this my examination, or the matters in question in this cause.

EDWARD N. KENT.

STATE OF NEW YORK,
City and county of New York.

I, Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of the said city, duly sworn commissioner, and by law acting as such, do certify, that at the request of Saml. F. B. Morse and others, plaintiffs named in the caption of the foregoing deposition, I caused the above named Edward Kent, deponent in the foregoing depositions, to come before me, and at the time and place in the caption stated, because the said witness resides a greater distance than one hundred miles from Frankfort, the place of holding the said court of the United States, as is stated; I did not cause any notice to be given to the adverse party of the time of taking this deposition, because the adverse party does not, as I know or believe, reside within one hundred miles of the place of taking the same; nor has the said party any agent or attorney known to me within that distance. That the said witness was by me carefully examined, cautioned, and sworn, then and there to testify the whole truth, and the said deposition was wholly reduced to writing by the said deponent, Edward Kent, in my presence, and subscribed the same; that I am not counsel or attorney for either of the parties, or interested in the event of the cause; all of which is certified to the said court, as the cause wherefor this deposition is taken, and for the manner it is done.

In witness whereof I have hereunto set my hand and affixed my official seal, this 12th day of September, 1849.

[L. S.]

CALEB S. WOODHULL,
Mayor of the said city of New York,
and chief magistrate of said city.

The deposition of William H. Ellet, taken under interrogatories copied herein on page 557, to wit:

Deposition of W. H. Ellet.

The deposition of William H. Ellet, of the city of New York, taken

before Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of the said city, at the office of the said mayor, in the city and county of New York, on the twenty-seventh day of September, 1849, to be read in evidence in a certain suit depending in the circuit court of the United States, for the eighth circuit and Kentucky district, Frankfort, wherein Saml. F. B. Morse, Alfred Vail, and Francis O. J. Smith are complainants, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings are defendants. The deponent being first carefully examined, and cautioned, and sworn to tell the whole truth, doth depose and say: That he lives a greater distance from the said town of Frankfort than one hundred miles; that he is acquainted with the handwriting of Professor Joseph Henry, formerly of Princeton college, and professor of natural philosophy, and who previously resided at New Albany; the letter now produced and shown to deponent, upon which he has written his name and the date of taking this deposition, is in the handwriting of Joseph Henry; and the signature thereto is in the handwriting of said Henry; that deponent is acquainted with said Henry's handwriting.

WILLIAM H. ELLETT.

C. S. WOODHULL, *Mayor*.

Copy.—Letter referred to and made an exhibit, to wit:

Copy.—Letter Joseph Henry.

PRINCETON COLLEGE, *Feb'y* 24, 1842.

Professor MORSE.

DEAR SIR: I am pleased to learn that you have again petitioned Congress in reference to your telegraph, and I most sincerely hope that you will succeed in convincing our representatives of the importance of the invention. In this, however, you may perhaps find some difficulty, since, in the minds of many, the electro-magnetic telegraph is associated with the various chemical projects constantly presented to the public, and particularly with the schemes so popular a year or two ago for the application of electricity as a moving power in the arts. I have asserted from the first that all attempts of this kind are premature, and made without a proper knowledge of scientific principles. The case is, however, entirely different in regard to the electro-magnetic telegraph; science is now fully ripe for this application, and I have not the least doubt, if proper means be afforded, of the perfect success of the invention.

The idea of transmitting intelligence to a distance by means of electrical action has been suggested by various persons, from the time of Franklin to the present; but until within the last few years, or since the principal discoveries in electro-magnetism, all attempts to reduce it to practice were necessarily unsuccessful. The mere suggestion, however, of a scheme of this kind is a matter for which little credit can be claimed, since it is one which would naturally arise in the mind of almost any person familiar with the phenomenon of electricity,

but the bringing it forward at the proper moment when the developments of science are able to furnish the means of certain success, and the devising a plan for carrying it into practical operation, are the grounds of a just claim to scientific reputation, as well as to public patronage.

About the same time with yourself, Professor Wheatstone, of London, and Dr. Steinhiel, of Germany, proposed plans of the electro-magnetic telegraph, but these differ as much from yours as the nature of the common principle could well permit; and, unless some essential improvements have lately been made in these European plans, I should prefer the one invented by yourself. With my best wishes for your success, I remain, with much esteem, yours, truly,

JOSEPH HENRY.

I, Caleb S. Woodhull, mayor of the city of New York, do certify, that the preceding letter of Joseph Henry was produced and made an exhibit before me, on the taking of the deposition of William H. Ellet, hereunto annexed, and was then and there marked as such.

In witness whereof I have hereunto set my hand, and affixed my official seal, this 27th day of September, 1849.

[L. S.] CALEB S. WOODHULL,

Mayor of the city of N. York, and chief magistrate of said city.

Deposition of G. P. Andrews.

Deposition of George P. Andrews, taken under interrogatories copied herein on page 557, to wit:

Deposition of George P. Andrews, of the city of N. York, taken before Caleb S. Woodhull, mayor of the said city of N. York, and chief magistrate of said city, at the office of the said mayor, in the city and county of N. York, on the 28th day of September, A. D. 1849; to be read in evidence in a certain cause depending in the circuit court of the United States, for the 8th circuit and Kentucky district, Frankfort, wherein Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith are complainants in chancery, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings are defendants; the said deponent, being first duly examined, and cautioned, and sworn to tell the whole truth, doth depose and say:

That, on the 22d day of August, A. D. 1849, Samuel F. B. Morse arrived in the city of New York, and came to the office of E. S. Smith, esqr., his counsel, to have said Smith, as such counsel, proceed to take deposition of witnesses in this cause; that among the witnesses said Smith proposed to examine was the Hon. Wm. C. Rives, of Virginia, for the purpose of proving by said Rives that what he had stated in two letters written by him to said Morse, one dated 1st March, 1838, the other dated Sept. 21st, 1837, was true in fact, and also other matters, supposed to be within the recollection of said Rives; that deponent, on the forenoon of said 22d day of August, 1849, about eleven o'clock,

learned the fact that said Rives had embarked on board the steamer America for France; which said ship, with Rives on board, sailed at twelve o'clock at noon of that day; and that, on account of the sudden departure of said Rives, his examination could not be taken on that day. That deponent proceeded immediately to said vessel, and saw said Rives, and showed to him said two letters; and said Rives stated to deponent that the said letters were in his handwriting, and that the signature at the foot of said letters was his sign-manual; and that he was ready, at any time when an opportunity should present, to verify the truth of their contents in a court of justice.

G. P. ANDREWS.

Sworn before me, this 22d day of Sept., 1849.

C. S. WOODHULL, *Mayor*.

Deposition of Rufus Prime.

Deposition of Rufus Prime, taken under interrogatories copied herein on page 557, to wit:

The deposition of Rufus Prime, of the city and county of New York, taken before Caleb S. Woodhull, mayor of the city of N. York, and chief magistrate of said city, at the office of the said mayor, in the city and county of New York, on the 28th of Sept., 1849; to be read in evidence in a certain suit depending in the circuit court of the United States, for the eighth circuit and Kentucky district, Frankfort, wherein Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith are complainants, and Henry O'Rielly, Eugene L. Whitman, and W. F. B. Hastings are defendants; the said deponent being first carefully examined, and cautioned, and sworn to tell the whole truth, deposes and says: He knows Mrs. Augusta T. Palmer, and her sons Charles C. Palmer and Frederick T. Palmer, formerly residents of the city of New York; that Mrs. Augusta T. Palmer and her two sons, above-named, were, as deponent believes, passengers on board the packet ship Sully, on her return voyage from Havre, in the fall of the year 1832; and that Mrs. Palmer and her two sons above named are now, and have been for several years past, residents in France, Europe.

The deponent further states, that he believes that, in the month of March, 1839, the said Frederick T. Palmer was residing at Rohan, Ireland, kingdom of Great Britain; deponent married the sister of said Frederick T. Palmer, and deponent is well acquainted with his handwriting, he having been several years clerk in deponent's office. The letters now produced and shown deponent, and made an exhibit in this cause, and upon which deponent has written his name and the date of taking this deposition, and which is annexed to this deposition, is in the handwriting of Frederick T. Palmer.

And deponent further states, he has heard one or more of the above named Augusta T. Palmer, Charles C. Palmer, and Frederick T. Palmer, mention that they made the voyage in company with Samuel

F. B. Morse, on board packet ship Sully from Havre, at [the] time he invented the electro-magnetic telegraph.

RUFUS PRIME.

Sworn to this 28th day of September, 1849, before me,
C. S. WOODHULL, *Mayor.*

Copy—letter of F. T. Palmer.

Copy—letter of F. T. Palmer made an exhibit, to wit:

RAHAN, *March 5th*, 1839.

SAMUEL F. B. MORSE, esq.

MY DEAR SIR: Since the receipt of yours of the 22d ultimo I have been trying to call to mind some of the particulars of the transaction therein referred to.

I perfectly recollect your describing to myself and others of our fellow passengers on board of the Sully, during her homeward passage from Havre to New York, in October, 1832, an electric telegraph, which you stated you had in vented, (or which had occurred to you,) since your being on board; it was certainly new to me, and to the best of my knowledge and belief was so also to the rest of our fellow passengers; for (if my memory does not betray me) no one at that time claimed a priority of invention in your method of applying the electric fluids to the conveying of dispatches. I certainly did understand at the time that you intended to perfect this invention, which you considered your own, and to obtain a patent for it. I am sorry that, from the time that has elapsed since this occurred, I am not able to give more minuteness to my evidence, and cannot call to mind the particulars of our conversations on the subject; but I can safely say that, to the best of my knowledge and belief, altho' we might all in turn, (as is generally the case on such occasions,) have suggested little modifications, yet no one at that time put forward any claim, either to priority of invention or hand in it, neither do I believe that they would have any right to do so; and certainly as far as my feelings go, I would consider it an injustice in your being deprived of (any) benefit resulting from this invention. I hope these lines may be of use to you, and beg you will not scruple to write to me if I can be of any further use; and wishing you every success in this business,

I remain, *very* dear sir, very truly yours,

F. T. PALMER.

I, Caleb S. Woodhull, of the city of New York, and chief magistrate of said city, do hereby certify, that the letter of Frederick T. Palmer on the accompanying sheet was produced and made an exhibit before me on taking the deposition of Rufus Prime hereunto annexed, and was then and there in my presence marked as such.

In witness whereof I have hereunto set my hand and affixed my official seal, this 28th September, 1849.

[L. S.]

CALEB S. WOODHULL,
Mayor of the city of New York,
and chief magistrate of said city.

Certificate of Mayor.

STATE OF NEW YORK,
City and county of New York, ss.

I, Caleb S. Woodhull, mayor of the city of New York, and chief magistrate of said city, duly sworn, commissioned, and by law acting as such, do certify, that at the request of Samuel F. B. Morse and others, plaintiffs, named in the captions of *of* the annexed depositions, I caused the foregoing William H. Ellet, Rufus Prime, and George N. Andrews, deponents in the annexed depositions, to come before me, and at the time and place in the captions aforesaid, because the said witnesses reside a greater distance than one hundred miles from Frankfort, the place of holding the said court of the United States, as is stated. I did not cause any notice to be given to the adverse party of the time of taking of the aforesaid depositions, because the said adverse party does not, as I know or believe, reside within one hundred miles of the place of taking of the same, nor has the said party any agent or attorney known to me within that distance.

That the said witnesses were each by me carefully examined, cautioned, and sworn then and there to testify to the whole truth.

That the said depositions were wholly reduced to writing by the said deponents, William H. Ellet, Rufus Prime, and George P. Andrews, respectively, in my presence, and described the same.

And I do further certify, that the exhibit, annexed to the depositions of Wm. H. Ellet and Rufus Prime respectively, were produced before me, and made exhibits in said cause, and are the identical exhibits in said depositions respectively referred to.

That I am not counsel or attorney for either of the parties, or interested in the event of the cause; all of which is certified to the said court as the cause wherefor this deposition is taken, and for the manner it is done.

In witness whereof I have hereunto affixed my seal and set my hand, this 29th day of September, A. D. 1849.

[L. S.]

CALEB S. WOODHULL,
Mayor of the city of New York,
and chief magistrate of said city.

Certificate of clerk.

UNITED STATES OF AMERICA,
Southern district of New York, ss.

I, James W. Metcalf, clerk of the district court of the United States of America, for the southern district of New York, do hereby certify, that I am well acquainted with the handwriting of Caleb S. Woodhull, whose name is subscribed to the annexed certificate, and that the signature to the same is in his proper handwriting. And I do further certify, that he was at the time of signing the same mayor of the city of New York, and chief magistrate of said city of New York, in the southern district of New York.

In testimony whereof I have hereunto subscribed my name, and affixed the seal of the said district court, this 29th day of September, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of the United States the seventy-fourth.

[L. S.]

J. W. METCALF, *Clk.*

Deposition of J. F. Frazer.

Deposition of John F. Frazer, taken under interrogatories copied herein on page 557, to wit:

STATE OF PENNSYLVANIA,
City and county of Philadelphia, ss.

Deposition of John F. Frazer, of Philadelphia, taken before J. Burchard, a commissioner of the United States for the eastern district of Pennsylvania, to take depositions to be read in the several courts of the United States, at Jones' hotel, in said city of Philadelphia, in the county aforesaid, to be read in evidence in a certain suit depending in the circuit court of the United States, for the eighth circuit, Kentucky district, Frankfort; wherein Samuel F. B. Morse, Francis O. J. Smith, and Alfred Vail are complainants in chancery, and Henry O'Rielly, Eugene L. Whitman, and W. F. Hastings are defendants; the said deponent being examined, cautioned, and affirmed to tell the whole truth, doth depose and say as follows:

That he is a professor of natural philosophy and chemistry in the University of Pennsylvania; aged 37 years. The deponent further says, that he has examined with care the annexed drawings marked A B, upon which he has written his name, and the date of the taking of this deposition, and will annex the same hereto, which purports to be a drawing of the electro-magnetic telegraph of Professor Morse, and of Barnes & Zook, for the purpose of forming an opinion as to their identity or dissimilarity; that to the best of his knowledge and belief, they are in all essential particulars the same—that is, they each consist of a main battery and receiving magnet, or mutator, the object of which is to make or break the connexion of the poles of the local or resident battery; and thus, at pleasure of the operator, communicate or destroy the magnetism of the temporary magnet connected with the writing apparatus or pen; it consists of one or more local batteries, the wires of which pass around the coil of the register magnet, which is the same in both, of a pen or point attached to the register magnet, or to its keeper, and of a band of paper which is gradually passed by machinery in such a position as to be struck by the pen when elevated or pushed forward; the principal differences appear to be as follows: first, in the receiving magnet or mutator, in Morse's apparatus, the hollow coil contains within it a piece of soft iron, which is magnetized, as is well known, by the passing current; the piece of metal by which the connexions of the local battery are made or broken, is attached to a

piece of soft iron placed near to, and in face of the end of this soft iron cove, so that when the latter becomes magnetic it attracts the former, and this brings the connecting piece in contact with the pen, through which the current of the local battery is transmitted; when the current of the main battery is broken, the iron cove of the coil or helix ceases to be magnetic, and the connecting pieces drawn back by a spring, and the current of the local battery broken. In Barnes & Zook's apparatus, the same effect is produced by attaching the connecting piece to the iron cove, which is made larger than the coil. It is well known that when the current passes, the pen cove becomes magnetic, and is attracted by the coil in such a way as to bring the middle of the iron into the middle of the coil; when the current ceases, and the iron is no longer magnetic, a spring drives the cove out again; the action of the spring being moreover arrested by a permanent magnet. In the instrument of Morse, there is but a single local battery, and the current is either passed or checked; but in the instrument of Barnes & Zook, the local battery is double, and the connecting wires are so arranged that when the piece connected with the cove of the mutator is in contact with the pen upon one side of it, one of the batteries transmits its current in one direction; and when the piece is in contact with the other pen, the other battery transmits a current in the opposite direction; this peculiarity is connected with the different arrangement of the pen.

In Morse's apparatus the current of the local battery magnetizes the soft iron cove within a second coil, and over this is suspended upon one end of a lever a soft iron keeper, the pen or marker being attached to the other end, so that when the keeper is suddenly drawn by the attraction of the temporary magnet, the pen is smartly thrown up against the paper, which passes over rollers above it; when the magnetism ceases, the pen falls again by the greater weight of that end of the lever and by the action of the spring.

In Barnes & Zook's instrument there is a similar coil, and a soft iron cove within it; and the pen is attached to the coil which is moveable, either by rolling or by vibrating on a fulcrum; opposite the ends of the iron coil are adjusted permanent horse-shoe magnets, similar poles being in face of each other on opposite sides of the cove; the peculiar adjustment of the connecting of the local battery before described, causes the current to pass alternately in opposite directions through the coil, and then the same end of the coil assumes, alternately, opposite magnetic polarity, and is attracted and repelled alternately by the two permanent magnets.

These appear to the deponent to be the differences in the arrangements of the apparatus of Morse and that of Barnes and Zook, and the deponent says that, to the best of his knowledge and belief, the differences are merely in the arrangement, and that they include the same principle, to wit, that of making dots on paper by means of the attraction of an electro-magnet for its keeper, and the cessation of the attraction of this attraction when the current is stopped. In the arrangement of Morse, the magnet is permanent, and the keepers soft iron,

moveable and attached to the pen. In the arrangement of Barnes and Zook, the magnet is moveable and has the pen attached to it, while the keepers, of which there are two, are *prominent* magnets, and are fixed.

And the deponent further says, that to the best of his belief no advantage will be found in practice in the arrangement of Barnes and Zook over that of Morse.

In answer to the following question, viz: Have you seen and read the article commencing on page 400 of Silliman's Journal of Science, in vol. 19, of 1831, headed Electro-magnetism, appendix?

On the application of the principle of the galvanic multiplier to electro-magnetic apparatus, and also to the developments of great magnetic power in soft iron, with a small galvanic element by Professor Joseph Henry of the Albany academy, now shewn to you, and after writing at the head of said page 400 your name and the date of the taking of this deposition? If so, please state about how long is it since you read that article.

The deponent answering said question says: I first read that article about five years ago.

To the following question, viz: Will you now look over the said article, and examine the several experiments and propositions therein enumerated, and the scientific facts therein stated to have been ascertained by Professor "Henry" as the results of his experiments and discoveries; and then please state whether, in your opinion, the scientific facts and discoveries therein stated as ascertained by Professor Henry, do indicate or suggest to the mind, as a scientific fact, that permanent signs can be imprinted at a distance by means of electro-magnetism?

In answer to said question deponent says: I cannot see that any such fact is indicated.

In answer to the following question, viz: Please state whether or not, in your opinion, Professor Henry, in that article, does make any application of the scientific facts therein stated, as ascertained by him, to the art or invention of Professor Morse, to wit, that of imprinting permanent signs at a distance by means of electro-magnetism?

In answer to said question deponent says: To the best of my belief he does not.

In answer to the following question, viz: Have you ever seen or heard described the project of Mr. Barlow of forming an electro-magnetic telegraph referred to in that article; or do you know of any work in which Barlow's project of a telegraph is described?

In answer to said question deponent says: I have never been able to find its description in any work, nor have I heard it described.

To the following question, viz: So far as your knowledge of the science of telegraphing extends, was or was not the discovery or invention of Professor Morse the first original discovery or invention of the art of imprinting permanent signs at a distance by means of electro-magnetism?

In answer to said question deponent says: It was; Steinhiel makes dots upon paper by the deflection of needles; but his invention was, I believe, subsequent to that of Morse.

To the following question, viz: When did you first hear or learn of the discovery or invention of Professor Morse; and at the time you first heard of it was it then new to you and to scientific men, so far as your knowledge extends?

In answer to said question deponent says: I first saw the discovery of Professor Morse described in the Franklin Institute Journal, in the year 1838, I think. I then regarded it as new, and I believe it was so regarded by scientific men.

To the following question, viz: Have you, since hearing of Professor Morse's invention, made research and examined foreign and American journals of science, for the purpose of ascertaining the origin and progress of the science of telegraphing; and if so, to what extent have you carried your researches and examinations in this respect?

In answer to said question deponent says: I have examined every journal and publication, domestic and foreign, upon which I could lay my hands, and which I thought likely to contain any thing upon the subject of electro-telegraph, to which my attention was drawn as a part of my professional studies, and upon which I lectured publicly.

To the following question, viz: Will you now state, so far as your knowledge extends, or so far as you have been able to discover by said research and examination, whether, in your opinion, Professor Morse was the first discoverer or the first person who made the application of the art of imprinting permanent signs at a distance by means of electro-magnetism?

In answer to said question deponent says: To the best of my knowledge he was. Deponent further says, I have devoted my attention to the sciences of natural philosophy and chemistry for about 16 years, and have been a professor of those sciences for about eight years in the Franklin Institute and High School of Philadelphia, and in the University of Pennsylvania, and have lectured and experimented frequently upon those sciences.

To the following question, viz: Please look upon the drawing now shown you, and marked plate 1, C D, and after having written your name upon it, and the date of taking this deposition, suppose A to be a piece of soft iron bent in a horse-shoe magnetic form, and B being an uncharged electro-magnet in the position of the keeper or armature of said magnet A, then state what is the magnetic condition of the two in relation to each other.

In answer to said question deponent says there is no action.

To the following question, viz: What is the magnetic condition of each of the two when B is charged, so that N is the north pole, and S is the south pole of said magnet B?

In answer to said question, deponent says, the pole 1 of the magnet A, opposite N, will be made south, and the pole 2, opposite S, will be made north by induction, attracting concurrently the magnet B.

To the following question, viz: Look upon the drawing now shown to you, and marked E E, plate 2, and after having written your name upon the same, and the date of taking this deposition, then please state whether the permanent magnet D is, or not, in Barnes & Zook's instrument a mechanical equivalent for the spring C, in plate 1 C D.

Deponent in answer to said question says: It is. Deponent further says that he resides at a greater distance from Frankfort, Kentucky, than one hundred miles; deponent further says that he does not know, nor can set forth, any other matter or thing which may be of benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this his examination, or the matters in question in this cause.

JOHN F. FRAZER.

STATE OF PENNSYLVANIA,
City and county of Philadelphia, ss.

I, Jabez Burchard, a United States commissioner for the eastern district of Pennsylvania, duly appointed to take depositions to be read in the circuit courts of the United States, and duly commissioned and sworn, and acting as such by law and virtue of my commission, do certify, that at the request of Sam'l F. B. Morse, Francis O. J. Smith, and Alfred Vail, complainants, I caused the above named John F. Frazer, the deponent in the foregoing depositions, to come before me at the place in the caption stated, because the said witness resides at a greater distance than one hundred miles from Frankfort, the place of holding the said court of the United States, as is stated.

I did not cause any notice to be given to the adverse parties of the time of taking of this deposition, because the said adverse parties do not either of them, as I know or believe, reside within one hundred miles of the place of taking the same, nor have said parties, or either of them, any agent or attorney known to me within that distance. That said witness was by me first carefully examined, cautioned, and affirmed, then and there to testify the whole truth; that the said deposition was wholly reduced to writing by me in the presence of said witness, and he then and there in my presence subscribed the same.

That I am not of counsel or attorney for either of the parties, or interested in the event of this cause. And I do further certify, that the several exhibits hereunto annexed were produced and made exhibits in said cause by the said deponents, and the same are the identical exhibits referred to by said deponent in the foregoing deposition.

All of which is certified to said court as the cause wherefor this deposition is taken, and the manner it is done.

In witness whereof I have hereunto set my hand and seal, this fifteenth day of September, A. D. 1849.

J. BURCHARD,
U. S. com. for eastern district of Pennsylvania.

UNITED STATES OF AMERICA,
Eastern district of Pennsylvania, ss.

I do hereby certify, that Jabez Burchard, esq., before whom the foregoing deposition was taken, and who has subscribed the accompanying certificate thereto, was at the time of taking said deposition and subscribing said certificates, and still is, a commissioner of the circuit court of the United States, in and for the eastern district of Pennsylvania, in the third circuit, duly appointed and qualified.

In testimony whereof I have hereunto subscribed my name and affixed the seal of said circuit court, at Philadelphia, this 15th [L. S.] day of September, A. D. 1849, and in the seventy-fourth year of the independence of the said United States.

GEORGE PLITT,
Clerk circuit court.

Deposition of W. R. Johnson.

Deposition of Walter R. Johnson, taken under interrogatories copied herein on page 557, to wit:

SAMUEL F. B. MORSE et als.
vs.
HENRY O'RIELLY et als.

In equity, in the circuit court of the United States, for the district of Kentucky.

The deposition of Walter R. Johnson, being first duly sworn, made and taken before the undersigned, W. W. Seaton, mayor of the city of Washington, to be read on final hearing in the above entitled case.

Answer to the first interrogatory: My age is fifty-five years; my profession is that of a civil and mining engineer, and professor of mechanical and physical science; and my residence the city of Washington, in the District of Columbia.

Answer to 2d interrogatory: I am acquainted with the invention called Morse's Magnetic Telegraph. I became acquainted with it in 1842, 1843, and 1844, while being exhibited and explained in the Capitol at Washington by Prof. S. F. B. Morse.

Answer to the 5th interrogatory: Professor Morse did, in 1844, show me the magnetic telegraph in action, and conveying messages to and from Baltimore, about the time of the setting of the convention there for nominating a candidate for the presidency; he had previously shown one [in] action from one part of the Capitol to another.

Answer to 6th interrogatory: The annexed drawing (plate No. 2) exhibits essentially the machine as seen by me at the times mentioned in my answers to the 2d and 5th interrogatories; and the description thereunto annexed is a true description *is a true description* of the instrument as then exhibited and described to me, with the exception, that instead of the pointed marker y for impressing the paper as it

passed over the roller *a*, the earlier machines which I saw had a pen kept supplied with ink for marking the paper, this pen being set in motion by the action of the magnet, in the same manner as the point Y is represented to be in this drawing. The drawing above referred to is marked "Morse's Instrument," and I have signed my name to the said drawing, and also to the description thereunto annexed, and have added the date of the taking of this deposition.

Answer to the 23d interrogatory: I have never seen the instrument called Barnes & Zook's Telegraph.

Answer to question 26: I have examined the drawings marked "Barnes & Zook's" instrument, called the "Columbian," and have subscribed thereto my name, and have added the date of the making of this deposition. From an examination of the drawing alone can I speak of the instrument which it represents, having constantly a reference to the description and explanation thereunto appended. I have never seen the telegraph of Barnes & Zook.

I answer to the question whether, in my opinion, the instruments of Morse and Barnes & Zook are, in their essential principles, the same: The important facts or essential principles in both are a "main battery," a main wire, "a helix," within said main wire a key and anvil for closing and opening the current of the main battery; also a "local battery" to be opened and closed by the action of the "main battery," and in the circuit of the local battery of each is a "helix," the purpose of which is to magnetize a bar of soft iron, and the purpose of that magnetization to communicate motion to a marking point or pen. Both have rollers, over which a strip of paper is passed while in the act of being marked or impressed.

Answer to the twenty-seventh interrogatory: The two instruments produce substantially the same results, by means substantially the same.

Answer to the 28th interrogatory: The differences do not affect the essential principles of the two instruments. The nature of the differences, all of which are in unessential parts, may be stated as follows:

1. In the helix E, marked "receiving magnet" in Morse's instrument, the attraction takes place between a bar of soft iron within the helix, made temporarily magnetic by the passage of electricity through the wire, and [an]other bar of soft iron, F, which latter piece is magnetized by the influence of that which is within the helix, and is consequently attracted by it, and moves towards the end of the bar within the helix. When the current of electricity from the main battery ceases to traverse the helix in consequence of the rising of the key D from the anvil C, the bar within the helix ceases to be magnetized, and consequently ceases to magnetize and to attract F; when F is drawn towards the receiving magnet the circuit of the local battery is closed by L coming in contact with M; and when, by the action of the light spring H, F is drawn back from the receiving magnet, the local battery is open.

In Barnes & Zook's instrument the "receiver" or "mutator,"

when the current passes, renders a bar of iron within the helix magnetic, which is then capable of being drawn towards a magnet, Z, notwithstanding the resistance of the coiled spring H; the magnet Z is a permanent magnet, and would continue to hold the bar of soft iron F, unless a spring, H, (which, in this case, must have considerably more elastic force than the correspondent spring in Morse's instrument,) were applied to separate the two.

In both instruments the attractive action exerted becomes available for the purpose of closing the circuit of the local battery solely in consequence of the passage of electricity through the helix; and it is a matter of entire indifference, so far as the result is concerned, whether a powerful permanent magnet placed at Z be made to act on the magnetized bar F, or, as in Morse's arrangement, the bar F be acted upon by the magnetized bar within the helix. The retracting spring H, in the Barnes & Zook instrument, must, when other parts are equal, be more powerful than in that of Morse; and in this respect Barnes & Zook's arrangement is worse than Morse's. This is so, because every increase of the weight and strength of parts in a machine is an evil when it exceeds what is necessary to produce the desired results, and preserve the integrity of the machine.

2. In the manner of working the marking pen by Barnes & Zook there is a similar variation from, without improvement on, Morse's plan. There is no change in essential principles or useful effects.

In Morse's telegraph the circuit of the local battery, when closed, causes the current to traverse the helix R, making the bar of soft iron in its centre into a magnet, which then attracts towards itself the bar of soft iron T, setting in motion the pen y, and impressing the paper on the roller a.

In the Barnes and Zook telegraph, the closing of the battery O makes the bar of soft iron into a magnet, so that its two ends are attracted respectively by the two poles of the horse-shoe magnet T U, and the marking of the paper is produced. When the circuit of the main battery is opened, the spring H draws back the bar F so far, that the point J comes in contact with K, and closes the circuit of a second local battery Q, whereby a current of electricity is sent through R in a reverse direction from that in which *is now* before; then the bar S has its polarity reversed, and it becomes attracted towards the points V and W, and thus the bar of soft iron must not only have its magnetism withdrawn, but reversed at every touch of the key D.

I will say in a few words, that Morse employs his local battery to bring the pen point in contact with the paper in a very simple and convenient way, and uses a spring to draw it away. Barnes and Zook employ two of Morse's local batteries, one to press the needle to the paper, and the other to draw it away. The second local battery is no more than an equivalent for a spring, and cannot in any sense be regarded as an improvement. Thus two local batteries, two circuits of wire, and two permanent magnets are substituted, and with manifest disadvantage, to perform the work of the one simple arrangement of

Morse; all this complexity of parts doing little or nothing else but to disguise the identity of principle which brings the two instruments to similar results. *That* Morse in the first place adopted the clumsy arrangement of Barnes and Zook, there might then have been some ingenuity in reducing it to the beautiful simplicity and efficiency which his instrument now possesses; and had a change in this direction been effected by Barnes and Zook, they might have been entitled to some credit for cleverness of invention; but as it is, I consider their device but a poor attempt to substitute one mere equivalent for another in the plan of Morse, without the slightest pretension that the parts substituted add anything to the convenience or efficiency of his machine.

Answer to interrogatory No. 53. A motive power is that force upon the exertion of which the motion of machinery and the production of mechanical effects depend.

To the interrogatories numbered 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 54, 55, 56, 57, 58, 59, and 60, he has no other or further knowledge than is substantially embraced in his answers already given to the interrogatories herein specifically replied to.

WALTER R. JOHNSON.

The undersigned, W. W. Seaton, mayor of the city of Washington, hereby certifies, that the above named Walter R. Johnson appeared in my presence, and having been duly sworn on the holy evangelists of Almighty God to tell the truth, the whole truth, and nothing but the truth, in reply to the foregoing interrogatories, made and signed in his own proper handwriting the above answers to the said interrogatories.

Witness my hand and seal this 1st day of October, 1849.

W. W. SEATON, *Mayor.*

Attest: WM. J. McCORMICH, *Register.*

STATE OF PENNSYLVANIA,
City and county of Philadelphia, ss.

Deposition of Francis Fisher, of Philadelphia, taken before J. Burchard, a United States commissioner for the eastern district of Pennsylvania, appointed to take depositions to be read in the courts of the United States, at Jones' hotel, in said city and county of Philadelphia, on the 15th day of April, A. D. 1840, to be read in evidence in a certain suit now depending in the circuit court of the United States for the 8th circuit, Kentucky district, Frankfort, wherein Samuel F. B. Morse, Francis O. J. Smith, and Alfred Vail, are complainants in chancery, and Henry O'Rielly, Eugene L. Whitman, and W. F. Hastings are defendants.

Deposition of Francis Fisher, taken under interrogatories copied herein on page 557, to wit:

Deposition of Francis Fisher.

The said deponent being first examined, cautioned, and sworn to tell the whole truth, doth depose and say as follows: That he, deponent, lived at a greater distance from Frankfort, Kentucky, than 100 miles.

To the following question, viz:

Question. *Was* you a passenger on board the packet ship Sully on her passage from Havre in the fall of 1832?

Deponent answers. I was; (to the foregoing question, viz:)

Question. Do you recollect and can you state the name of the captain of that ship, and some of the passengers?

Deponent answers. The captain's name was Pell. Among the passengers I recollect the Hon. W. C. Rives and family; Dr. Charles T. Jackson, of Boston; Mr. C. C. Palmer, Frederick T. Palmer, the mother and family; Professor S. F. B. Morse; and Lewis Rogers, of Virginia.

Question. Did you, in the year 1837, have any correspondence with Professor S. F. B. Morse?

Answer. I had; I received from him two letters, and replied to both of them. The date of the first letter I received from Professor Morse was some time in August, 1837.

Question. What has become of that letter?

Deponent answers. I have made diligent search for it among my letters and papers, and have not been able to find it; it has been mislaid, lost, or destroyed.

Question. Do you recollect the contents of that letter?

Deponent answers. I recollect that it contained a request, in substance, that I would give a statement of my recollection as to what occurred on board the said packet ship Sully, in reference to the telegraph; I do not recollect the precise language used.

Question. Please look upon the paper now shown you, and state whether that paper is your reply to Professor Morse's letter of August, 1837.

Deponent answers. It is, and is in my handwriting. It was written about the time it bears date; it was sent to Professor Morse by mail. From the post mark, it appears to have been mailed to Professor Morse on the 21st of September; and I have no doubt it was so mailed on the 21st day of Sept., 1837.

The original letter produced, and to which I refer, I have caused to be marked in red ink, H; and have written my name upon the same, and the date of the taking of this deposition, and will annex the same to this deposition.

At the time I wrote that letter, I believed that what is stated in that letter was true; I still believe it to be true; my subsequent reflections upon the subject, on refreshing my recollections, have tended to confirm my belief; and I am confirmed in the belief that what is therein stated is true in fact. Professor Morse, during the voyage on board the packet-

ship Sully, did, from time to time, communicate to me and the other passengers his invention, and his proposed plan of telegraphing, and the progress he had made, from time to time, on board the ship in maturing his invention. He was constantly occupied in investigating and in maturing his plan of communicating intelligence by telegraph, which, at that time, I deemed visionary. I am sure that neither Dr. Jackson nor any other passenger, except Professor Morse, were engaged on board of that ship in planning [or] designing any machine or telegraphic instrument, or the mode of communicating intelligence by telegraph. Mr. Morse's mind, and his only, seemed to be engaged in that subject, and that entirely; although he did make many inquiries, and proposed various scientific questions to Mr. Rives, Dr. Jackson, myself, and other passengers, which were readily and freely answered by us all. I received a letter from Professor Morse, and date of Nov. 14, 1837. I now produce the original letter, and cause it to be marked A, and have written upon it my name, and the date of taking of the deposition, and will annex the same to this deposition. I received that letter on or about the 17th day of Nov., 1837. I wrote a reply to that letter on the 17th of Nov., 1837, and sent the same by mail to Prof. Morse on or about that day; the letter now produced and shown to me, and marked in red ink, D, is the original letter written by me to Professor Morse, on the 17th Nov., 1837, in answer to his of the 14th of Nov., 1837. I have written my name upon said letter, and the date of taking of this deposition, and will annex the same to this deposition.

At the time I wrote said last named letter, I did verily believe that what I stated in that letter was true, and I do still believe that the same is true. My subsequent reflections upon the subject have tended to and have strengthened my conviction, that what I have stated in that letter is true.

In the month of June, 1847, I received a letter from Dr. Charles T. Jackson, of Boston. The letter now produced, and upon which I have written my name, and the date of taking this deposition, and which I annex to this deposition, and caused to be marked E, is said original letter in the hand writingof Dr. Jackson; it was received by me by mail early in June, 1847; there was enclosed in that letter, and came to my hands with it, a paper which I now produce, and upon which I have written my name, and the date of the taking of this deposition, and have also marked A, B, C, and will annex the same to this deposition. I wrote to Dr. Jackson a letter, in reply to the one I received from him, under date of the 9th of June, 1847, and sent it in mail to Dr. Jackson, directed to him at Boston, as requested; it was mailed to him at or about the time it was written. I retained a copy of that letter; I have not seen the original letter since I mailed it. The paper now produced and marked B, C, D, is a true copy of the original letter I sent to Dr. Jackson. I have written upon said copy my name, and the date of the taking of this deposition, and will annex it to this deposition.

I do not recollect that I ever wrote any other letter to Dr. Jackson. I do not find any other letter from him among my correspondence.

In the letter to Dr. Jackson I must have had reference to the two letters I had written to Professor Morse, as I have above stated, and which are annexed to this deposition. Dr. Jackson did not, to my recollection, while on board the packet ship Sully, or elsewhere, give any minute or any description of the appropriate means, or of any means, or of any instrument, by which news might be communicated by galvanic electricity, or by electro-magnetic machinery. I have no recollection of his having either proceeded to show how it might be done, or of his having shown how it might be done.

Question. Did Professor Morse, while on board the packet ship Sully, to your knowledge, profess, or did he manifest, utter ignorance of the science of electro-magnetism?

Deponent answers. He did not; when I [so] stated in my letters to Dr. Jackson, "I do not think Mr. Morse brought to the consideration of the subject any previously acquired scientific knowledge." I can only state I intended to convey my impression that this was an inference that I drew from the fact that the science of electro-magnetism did not pertain to the science or art in which Professor Morse had previously been engaged. I had never previously, when in Europe, heard him mention to me the subject of electro-magnetism.

Question. Was a mode of telegraph communication described by Dr. Jackson while aboard the packet ship Sully?

Deponent answers. To the best of my knowledge and recollection there was not.

Question. Did Dr. Jackson, aboard the packet ship Sully, describe a part of this invention, the use of an electro-magnet to act on one end of lever in such a manner as to cause the other end to imprint dots or lines, at the pleasure of the operator, on a strip of paper moved uniformly underneath it by means of a cylinder set in motion by clock work?

Deponent answers. He did not; or I should perhaps say I have not the slightest recollection of his having done so.

Question. Was it the opinion of yourself, or of other passengers, at the time, that Dr. Jackson was, in every important respect, the author of the invention?

Deponent answers. That was not then, and is not now, my opinion; nor have I ever heard any of the other passengers intimate that such was their opinion. So far as I am concerned I never, while on board the ship, entertained the idea that Dr. Jackson had made any such discovery or invention. In answer to what I am interrogated about in the said interrogatories contained in the paper enclosed in Dr. Jackson's letter to me, I would say, that inasmuch as I did not know, nor did I ever conceive the idea, that Dr. Jackson invented any thing aboard the Sully, I cannot state that any invention of his is in any respects similar to that patented to Professor Morse, nor do I know that he ever invented any such thing as that patented to Professor Morse.

I am well acquainted with the handwriting of the Hon. William C. Rives, of Virginia, who was a passenger with us on board of the Sully in 1832.

The papers now produced to me, one of which is marked in red ink I, and the other of which is marked in red ink C, and upon which I have written my name and the date of the taking of this deposition, and will annex the same to this deposition, are each of them in the handwriting of said W. C. Rives, of Virginia.

Question. Please look upon the paper in print headed "The Observer, New York, Saturday, February 2, 1839," and marked in red ink K, and write upon the paper, opposite said printed article now shown to you, your name and date of the taking of this deposition, and then read the same down to and including the words "applicable to the case," opposite your name; and then state whether or not you can prove that the origin of the idea of the new telegraph to be as stated in that part of said article which precedes the said words "applicable to the case," above quoted?

Deponent answers. I certainly cannot prove it; nor do I know the facts to be stated in said article.

Question. Do you recollect that Mr. Morse acknowledged himself wholly unacquainted with electro-magnetism, or that Dr. Jackson informed him of any particular discovery applicable to the case?

Deponent answers. I do not; nor do I know such to be the fact.

Question. Can you now call to mind the name of any person, other than Professor Morse, also on board the packet ship Sully, [who] invented, or who suggested the idea of an electro-magnetic telegraph?

Answer. Certainly not.

Question. Do you know, or do you now believe, that Dr. Jackson did, on board the packet ship Sully, entertain the idea; or did you, from any thing that was said or done by him, infer that he then entertained the idea of applying his scientific knowledge to the invention of an electro-magnetic telegraph; or that he was associated with any other person or persons in doing so?

Deponent answers. I do not know, nor do I believe such to be the fact; nor did I infer any such thing from any thing that was said or done on board the packet ship Sully. Deponent further says that he does not know, nor can he set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this his examination, or matters in question in this cause; and is aged 42 years.

J. FRANCIS FISHER.

I, J. Burchard, a United States commissioner, in due form of law appointed for the eastern district of Pennsylvania to take affidavits and depositions, to be read in the several courts of the United States, and duly commissioned, sworn, and acting as such, and by law, and by virtue of said commission acting as such, do certify that at the request of Samuel F. B. Morse, and others, plaintiffs in the caption to the

foregoing commission, I caused the above named deponent, J. Francis Fisher, in the foregoing deposition, to come before me at the time and place in the caption stated, because the said witness resided more than one hundred miles from Frankfort, the place of holding the said court of the United States, as is stated; I did not cause any notice to be given to the above parties of the time of taking this deposition, because the said adverse parties or either of them do not, as I know or believe, reside within one hundred miles of the place of taking the same, nor have said parties, or either of them, any agent or attorney, known to me within that distance; that the said witness was by me first carefully examined, cautioned, and sworn, then and there to testify the whole truth; that the said deposition was wholly reduced to writing by me in the presence of the said witness, and he then and there in my presence subscribed the same; that I am not of counsel or attorney for either of the parties, or interested in the event of the cause; and I do further certify, that the several exhibits hereunto annexed were produced and made exhibits in said cause by the said deponent, and the same are the identical exhibits referred to by said deponent in the foregoing deposition; all which is certified to said court as the cause wherefor this deposition is taken, and for the manner it is done.

In witness whereof I have hereunto set my hand and seal, this 15th day of September, 1849.

[L. S.]

J. BURCHARD,
U. S. commissioner for eastern district of Penna.

UNITED STATES OF AMERICA,
Eastern district of Pennsylvania, ss:

I do hereby certify, that Jabez Burchard, esquire, before whom the foregoing deposition was taken, and who has subscribed the accompanying certificate thereto, was at the time of taking said deposition and subscribing said certificate, and still is, a commissioner of the circuit court of the United States, in and for the eastern district of Pennsylvania, in the third circuit, duly appointed and qualified.

In testimony whereof I have hereunto subscribed my name and affixed the seal of said circuit court, at Philadelphia, this fifteenth day of September, A. D. 1849, and in the seventy-fourth year of the independence of the said United States.

[L. S.]

GEORGE PLITT,
Clerk circuit court.

Exhibits.

Exhibits referred to in deposition of F. Fisher, to wit:

PHILADELPHIA, *September 19th*, 1837.

MY DEAR SIR: I received your letter yesterday, and should have immediately replied, but was prevented by business.

I certainly recollect many conversations with you on the subject of

an electric telegraph during our voyage from Europe in the Sully, in October, 1832. I should have some difficulty in recalling with any precision the details of your plan of communication, but I think you spoke of a single wire, and letters or signs were to be indicated by a quick succession of strokes or shocks. We also discussed the mode of protecting the conductors both through and across rivers; and tubes of different materials were proposed to secure it against dampness, glass, clay, &c., &c., but doubting its practicability, I perhaps paid too little attention to your scheme.

Dr. Jackson, our fellow passenger, no doubt retains in his memory many more particulars, and as the plan was by no means matured in 1832, it is perhaps altogether unnecessary for me to say more than that I am at any time ready to give my certificate, that you proposed and were occupied about the details of an electric telegraph at the time referred to.

Wishing you all success in this as in every other occupation, and that the establishment of your fame to this invention may be as extensive as it is deserved,

I remain, with high respect, most respectfully yours,

J. FRANCIS FISHER.

SAM'L F. B. MORSE, esq.

I do hereby certify, that the above letter was produced and made an exhibit before me on taking the deposition of J. Francis Fisher, hereunto annexed, and marked as such, and referred to in said deposition.

In witness whereof I have hereunto set my hand and seal this 15th day of September, 1849.

[L. S.]

J. BURCHARD,
U. S. commissioner.

A.

NEW YORK CITY UNIVERSITY, *Nov.* 14, 1837.

TO JOSHUA FISHER, esq.

MY DEAR SIR: Let me in the first place thank you for your satisfactory answer to a former letter, requesting your testimony to the fact of my having invented the Electric Telegraph on board the ship Sully, in 1832. I little thought, when I made this request in order to prepare myself against foreign attack, that I should be under the necessity of again troubling you for evidence to defend myself against an attack at home; but so it is.

In my desire to be prepared with testimony similar to that which you and many others of my fellow-passengers so promptly gave me, I wrote a similar request to one of them, not doubting of a like reply; but, to my utter surprise, in his reply he preferred a claim to be a mutual invention. I wrote remonstrating with him, and making my appeal to his sense of honor and justice, and recalled to his memory the incidents on board ship, and detailed the rise and progress of the invention in

my mind. In his answer just received he makes a bolder encroachment, and now claims to be the principal inventor.

I had stated to him, among other things, that, in conversation with a group of passengers, the experiment of Franklin to ascertain the velocity of electricity was mentioned; it was remarked by one of them that the spark passed instantaneously a distance of four miles. I then observed, "If the presence of electricity can be made visible to any desired part of this circuit, I do not see why a system of signs could not be constructed to transmit intelligence instantaneously to any distance."

Now, while he does not claim this suggestion for himself, he yet denies it to me, and says, "one of the party, either Mr. Rives or Mr. Fisher, said, it would be well if we could send news in the same rapid manner."

I think if you had made the observation attributed to you, you will be likely to recollect it; will you, therefore, oblige me with an answer to these two questions:

First. Do you recollect having made the observation, attributed either to you or to Mr. Rives?

Second. Have you any impression, from your recollection of what occurred on board the Sully, that any other person than myself was the inventor of the Electric Telegraph?

I beg you to excuse the trouble which I am compelled by circumstances to give you, and to believe that I am, with sincere respect and esteem,

Your obedient servant,

SAMUEL F. B. MORSE.

I do hereby certify, that the foregoing letter on this sheet was produced and made an exhibit before me, on taking the deposition of J. Francis Fisher, hereunto annexed and marked as such, and referred to in said deposition.

Witness my hand and seal, this fifteenth day of September, A. D. [L. S.] 1849.

J. BURCHARD,
U. S. commissioner.

D.

PHILADELPHIA, *Nov'r* 17, 1837.

MY DEAR SIR: I have just received your letter of November 14th, and am happy, so far as negatives go, to give a satisfactory answer to both your queries.

To the first. Do you recollect to have made the observation, attributed either to you or to Mr. Rives? (viz: it would be well if we could send news in the same rapid manner.)

I answer, certainly not; and it would have been strange, if not silly, to have done so, since the first mention of an electric or galvanic telegraph by you implied the possibility.

To the second. Have you any impression, from your recollection of

what occurred on board the Sully, that any other person than myself was the inventor of the Electric Telegraph?

I answer. I had no idea that any of our fellow-passengers could claim the credit of it. I am quite sure I received my first idea of it from you; that you were most interested in it; that you alone seemed disposed to test its practicability after landing. If you received any suggestions from others, as to the system of signs and mode of protecting the wires, you can, I suppose, best recollect. I am not disposed to claim any credit for said hints myself, and, trusting to my own memory, should be as little likely to attribute any merit to either of my own fellow-passengers.

I will, of course, give my testimony in a more formal way, if necessary, and remain,

Dear sir, with much respect, truly yours,

J. FRANCIS FISHER.

SAMUEL F. B. MORSE, esq.

I do hereby certify, that the above and foregoing letter was produced and made an exhibit before me, on taking the deposition of J. Francis Fisher, and marked as such, and referred to in our deposition.

In witness whereof I have hereunto set my hand and seal, this 15th [L. S.] day of September, 1849.

J. BURCHARD,
U. S. commissioner.

E.

BOSTON, *June 6th*, 1847.

DEAR SIR:

You may remember that I had the pleasure of being a fellow-passenger with you in the packet ship Sully on our return from France in October, 1832, and that during that voyage I introduced the subject of electro-magnetism as a matter of scientific interest, and stated that the electric current could be sent to great distances without any appreciable loss of time, and gave an account of experiments I had witnessed in Paris in proof of my assertion. Then either you or Mr. Rives said it would be well if we could send news in as rapid a manner; I am not sure whether you or Mr. Rives said this, but I am certain it came from the side where you and that gentleman were seated. Mr. S. F. B. Morse then said, "why can't we?" and I proceeded to show him it might be done by galvanic electricity, and by electro-magnetic machinery, giving a minute description of the appropriate means and instruments. Mr. S. F. B. Morse listened attentively, and took note of the conversation. The next morning he said, "I have not slept a wink all night; I have been thinking about the telegraph, and believe one may be made after the plan proposed by you." He entered into conversation, and I showed minutely how the thing could be done. I do not claim the telegraph as it now is, for it has been improved with the growth of science, and no one man can claim it as his invention.

Morse made sketches, and minuted facts in his note book. I also drew a plan or rough sketch of the lifting magnet in my note book and showed it to Morse, and we from that time discussed the subject every day, and Morse followed me about the ship with his note book in his hand, noting down all I told him on the subject. After my return to Boston I made the requisite experiments to prove what I stated, showing the experiments to Mr. Francis Allger, and using the very electro-magnet and battery I had on board the Sully in October, 1832, which machine I said, when on board the Sully, I had packed up with other philos. instruments in a large trunk, between decks, and therefore could not exhibit [it] to Morse. Now, the object of this letter is simply this, to ask you if you remember any thing about the conversation referred to above, and if you believe that I communicated any such information to Morse as to serve as the basis of his Electro-magnetic Telegraph. I wish also to inquire of you whether you ever gave Mr. Morse, as he pretends all the passengers did, a certificate that he was the discoverer and inventor of the electric telegraph, proposed in the Sully, and declared by Morse to have been invented by him then and there. I had a dispute with him several years ago, and not wishing to carry on a dispute after having fully stated my claims, I let the matter drop, and probably shall still leave my claims as they are stated in my re-examination; but being now engaged in another controversy about the discovery of the application of sulphuric either vapor, by inhalation, for the prevention of pain in surgical operations; and as Mr. Edward Warren, formerly of Bangor, Maine, [is] making an attack on me, which claims for his employer, W. T. G. Austin, the honor of that discovery, and taking advantage of my unsettled dispute with Morse to injure me by misrepresentations, it becomes necessary for me to make inquiry into that affair. Morse is writing letters to that Warren to publish against me, and therefore may yet come in collision with me. I happened to learn from your classmate, Mr. Allyne Otis, when dining in company with him at Mr. Thayer's, that you had not given Morse any certificate that you regarded him as the discoverer of the Electro-magnetic Telegraph, as invented on board the Sully, and that Mr. Morse had deceived me if he made me believe any such things. You will, therefore, very much oblige me by writing me a few lines on the subject, and stating your belief as to the origin of that discovery. I am going tomorrow to Lake Superior as U. S. geological surveyor of mineral lands of Michigan, and since that work is full of dangers, I do not feel that I should do justice to my friends if I did not take measures to secure my reputation from vilification; for it might happen that I shall not return to attend to this detraction by my enemies. I detest patents, and never got drawn into one until I was deceived and forced to apply for one in conjunction with that scoundrel whose name is wrongfully associated with mine I have broken all connexion with the patent, torn up his bond, and now declare the patent, so far as I am concerned, vacated, and the inhalation of vapor of ether free. This cause has provoked a virulent attack from Morton through his agents and

co-partners in the speculation, and they publish all sorts of falsehoods concerning me, and have raked up the old telegraph dispute.

I send you a copy of Morton and Morrison's infamous pamphlet, and will leave directions for Dr. Gay to send you his; please compare them.

Yours, truly,
C. T. JACKSON.

Dr. M. Gay, of this city, has written a history of my discovery of [the] ether affair, and Dr. J. B. S. Jackson, your classmate, now one of our most distinguished physicians, has also written in my favor. You will receive copies of these papers soon as they are out of press, which will be in a few days.

Most respectfully, your obedient servant,
CHARLES T. JACKSON.

J. F. FISHER, ESQ., Philadelphia.

Please address me in Boston, 31 Somerset street.

I certify, that the within letter was produced, and made an exhibit before me, in taking the deposition of J. Francis Fisher, hereunto annexed, and marked as such, and referred to in deposition.

Witness my hand and seal this 15th day of Septr., 1849.
[L. S.]
J. BURCHARD,
U. S. Comr.

After the enclosing letter had been written by Dr. Jackson, he thought it might be well to propose to you a series of questions respecting the points to which he more particularly asks your attention, and not having time to copy them himself, requested a friend, who now addresses you, to do it for him; not that he wishes you to reply to each in a formal manner, but to remind you of what he hopes you may have a distinct recollection of. He also wished me to say to you that a statement of the substance of your recollections, separate from any remarks as to what you do not recollect, would be desirable to him in case he should feel obliged, for the vindication of his moral character, to publish your testimony; I will add, that Dr. Jackson's friends in this city regard the attempt now making to injure his reputation, and to defraud him of the honor justly belonging to him as a benefactor of mankind, as originating in the basest selfishness and malice, and wholly unsupported by facts. I now subjoin the questions referred to above. Did Dr. Jackson mention, in conversation at the dinner table, the subject of electro-magnetism, and did Mr. Morse manifest utter ignorance of that science? Did you hear Dr. Jackson mention the experiment he had recently witnessed at Paris of transmitting electricity four hundred times round the Sorbonne without appreciable loss of time; was no doubt expressed as to the possibility of so doing; and did Dr. J. then mention, in confirmation of his statement, Franklin's experiments, in which he transmitted instantaneously electricity through the distance of several miles? Did Mr. Morse show that he had never heard of the

experiment before? Who first on board the Sully affirmed the practicability of applying electricity to telegraphic purposes? Was a mode of telegraph communication described by Dr. Jackson? Had Mr. Morse any share in the invention so far as it depended on the application of scientific principles? Had Mr. Morse any share whatever in the invention, beyond suggesting modifications in some of the mechanical details, and some of the signs to be employed? Did Dr. Jackson describe as a part of his invention the use of an electro-magnet to act on one end of a lever, in such manner as to cause the other end to impress dots or lines at the pleasure of the operator on a strip of paper moved uniformly underneath it by means of a cylinder set in motion by clock work? Was it the opinion of yourself and other passengers at the time that Dr. Jackson was in every important respect the author of the invention?

Was not the invention, in every essential feature, similar to that for which Mr. Morse has since obtained a patent, the kind of galvanic battery now used excepted?

The improvements in the battery, the results of the invention of Daniel and others, since the year 1832, Dr. J. regards as the only essential alteration in his plan, and as indispensable to convenient practical operation of the telegraph?

An early reply would confer a great favor. Dr. F. B. S. Jackson's article for the Medical Journal must be given to the printer in a few days, and he is quite desirous of being able to say that abundant evidence of the truth of Dr. Jackson's statements in regard to the telegraph exists, and has been seen by him.

I certify that the annexed paper was produced and made an exhibit in taking the deposition of J. Francis Fisher, hereunto annexed, and marked as such, and referred to in said deposition.

In witness whereof I have hereunto set my hand and seal, this 15th day of September, 1849.

J. BURCHARD,
U. S. Commissioner.

PHILADELPHIA, *June 9th*, 1847.

DEAR SIR: Your letter of June 6th was only delivered this morning. I lose no time in replying, according to your request, and am only sorry I cannot give explicit answers to the different interrogatories enclosed by another hand, in your letter, as my memory does not serve.

Some two or three years ago Mr. Morse applied to me for a certificate of his part in the invention, as well as I could recollect, and I readily stated my impressions, which on the whole were favorable to his claim, tho' I think not sufficiently so for his purpose, as I believe he has not printed my letter.

I did not, unfortunately, keep a copy of my letter to Mr. Morse; at the time I wrote it my recollections were, I doubt not, more vivid than they are now, but I think my statement did not run into detail.

Who first started the idea of applying electricity as a means of telegraphic communication it is entirely out of my power to affirm; I believe it arose in conversation among the parties named by yourself on board the ship Sully, and I am persuaded that Mr. Morse had not entertained it previously to his embarkation; but I am at the same time certain, that he, of all the party, seemed most struck by the idea, and most interested in carrying it out. I recollect Mr. Morse's note book, and his taking memoranda of information communicated by you as to electro-magnetic or galvanic machines. I recollect your describing the experiment you had recently witnessed of transmitting electricity four hundred times around the Sorbonne in a moment of time; but more than this I cannot say positively.

I remember various discussions as to the mode of notation, the best method of protecting the wires, which I think Mr. Morse then proposed to send underground within earthen tubes, but I should be very reluctant to give my affidavit of any particulars.

I do not think Mr. Morse brought to the consideration of the subject any previously acquired scientific knowledge, but I certainly must give him the credit of occupying his mind almost incessantly with it; of trying to collect in his note book every intelligent hint on the subject; that he obtained many from you I have little doubt, but as I was not very much interested in the matter myself, I did not believe at the time that Mr. Morse was likely to surmount the difficulties; I did not pay the attention to it which I should have done had I conceived I was present at the hatching of one of the greatest discoveries of the age.

I am exceedingly sorry you have had any difficulty with Mr. Morse on the subject. He always appeared a very amiable man, and I was, myself, glad he had gained a scientific reputation which I should not have predicted from any knowledge he seemed to have at the time, and I think he deserves as much credit for the invention as if he had previously made himself master of all the necessary science; whoever first stated the idea, he at once embraced it, and by dint of his inquiries, and by the aid he solicited from others, was able to carry it to perfection. Without your assistance, or that of others equally accomplished in science, he in all probability would have been unable to proceed, but would have ridden it as his hobby horse with as little progress as an infant on his; but the praise must be his of seeking, wherever he could find it, the science and mechanical skill which previously he had not, and using them in prosecution of his favorite scheme. I have only once seen Mr. Morse since our arrival at New York in the Sully, and cannot call myself his friend; but I feel it due to him to write to you as I have done, in which I trust I give you no offence, as I am very far from wishing to depreciate your share in this invention, which perhaps I value much below its merits, having long since come to the conclusion that the world is no better nor happier for the improved facilities of travelling or communicating, and however much railroads and the steam engine may have advanced our wealth and population, am rather peculiar—

the opinion that Fulton & Watt have not been really the benefactors of the human race.

Your share in the latter discovery I am disposed to prize much more highly, and I trust you will be able to sustain your right to it.

The blessing of the suffering, whom it will relieve, are better than fame. Of the last reward you have already gained much, and you are in a career to achieve still higher.

In an appreciation of which, and with sentiments of great respect, I beg to subscribe myself your obedient servant,

I certify that the preceding letter, consisting of two sheets, was produced as an exhibit in this cause on taking the deposition of J. Francis Fisher, and marked as such, and referred to in said deposition.

In witness whereof I have hereunto set my hand and seal, this 15th day of September, A. D. 1849.

J. BURCHARD,
U. S. Commissioner.

C.

SENATE CHAMBER, 1*st March*, 1838.

MY DEAR SIR: I have heretofore had the pleasure of stating to you, in writing, my recollection of your suggestion of the practicability "of transmitting intelligence by means of electricity," during our voyage from Havre to New York in the autumn of 1832. I am utterly surprised to learn that any one should have given me credit for suggesting it. I am perfectly sure that such a conception had never entered my mind, and that it was a complete novelty to me, when first presented to my contemplation by your conversations during the progress of our voyage above mentioned.

Wishing you, my dear sir, great success in maturing and carrying into execution an invention which promises to mark a new era in the progress of modern improvements, I remain, with great respect, your most obedient servant,

W. C. RIVES.

SAML. F. B. MORSE, esq.

I certify that the within letter was produced and made an exhibit before me on taking the deposition of J. Francis Fisher, hereunto annexed and marked as such, and referred to in said deposition.

In witness whereof I have hereunto set my hand and seal, this 15th day of September, 1849.

J. BURCHARD,
U. S. commissioner.

SENATE CHAMBER, *Sept.* 21, 1837.

MY DEAR SIR: I hope you will find in my multiplied and oppressive engagements here an apology for not having sooner answered your inquiry on the subject of your electro-magnetic telegraph. I retain a dis-

tinct recollection of your having explained to me the conception of this ingenious invention, during our voyage from France to the United States, in the autumn of 1832, and that it was more than once the subject of conversation between us, in which I suggested difficulties that you met and solved with great promptitude and confidence.

I am much flattered by your kind recollections of my family and myself, and I beg leave to assure you that it would give us all great pleasure to renew, in personal intercourse at home, the agreeable souveniers of our acquaintance and friendly relations abroad.

I remain, with great respect, your most obedient servant,

W. C. RIVES.

Prof. S. F. B. MORSE.

I do hereby certify, that the foregoing letter was produced, and made an exhibit before me, on taking the depositions of J. Francis Fisher, and marked as such, and referred to in said deposition hereunto annexed.

In witness whereof I have hereunto set my hand and seal, this 15th day of September, A. D. 1849.

[L. S.]

J. BURCHARD,
U. S. commissioner.

Deposition of Matilda W. Dana, taken under interrogatories copied herein on page 557, to wit:

Deposition of Matilda W. Dana.

Deposition of Matilda W. Dana, of Boston, in the State of Massachusetts, taken at the office of George S. Hillard:

I am the widow of Professor James Freeman Dana; my husband and myself resided in the city of New York in the years 1826–1827; my husband died on the 15th day of April, 1827, in the city of New York. In the year 1827 he delivered a course of lectures upon the subject of electro-magnetism, and also upon the subject of electricity, before the New York Athenæum, in the chapel of Columbia college. I attended several of these lectures; his mind was most intensely interested in the subject of electro-magnetism—so much so, indeed, that I frequently heard him talk of it in his sleep; I know that my husband, in the years 1826–1827, and up to the time of his death, was on terms of intimacy with Professor Samuel F. B. Morse, and was in the habit of frequently visiting in Professor Morse's painting room, which, at that time, was at the corner of Broadway and Pine street, in the city of New York; I have a distinct recollection of visiting Professor Morse's room, in 1827, in company with my husband, and of examining some of Professor Morse's paintings. My husband had a very keen perception of the beautiful, and was a great admirer of the fine arts, and took particular delight and interest in the art in which Professor Morse was at that time engaged. I have no doubt that this circumstance led him to cultivate an intimacy and friendship with Prof. Morse, and I know that such intimacy and friendship did exist up to the time of my husband's death; I frequently heard my husband speak of his having been on

visits to Professor Morse's rooms, and he frequently told me he had been on such visits. From what he said to me, and from what I saw, I know that he must have spent much time at Professor Morse's rooms. I frequently heard him speak of Professor Morse's pictures; there was one, I know, he much admired; that was the picture entitled "Una, the dwarf, and Arthur," from Spencer's Fairy Queen. My husband took me with him to Professor Morse's room to see that picture, and I recollect seeing it at his room, and it was much admired both by me and by my husband; and my husband was so much interested at that time with electro-magnetism, that it was a favorite theme in his conversations with all his associates and friends. He was in the habit of dwelling much upon it, and of explaining to his friends the results of his experiments in that science. From the terms of intimacy existing between him and Professor Morse, I can scarcely conceive it possible that he and Professor Morse should not have had frequent and repeated conversations on the subject of electro-magnetism. I knew that my husband, at that time, was in the constant habit of stating to his friends and associates his views of that wonderful science, which then was regarded as, in a great measure, new in this country, and little understood. He was unusually frank and communicative in his social intercourse with his friends; that was a distinguishing trait in his character. He seemed anxious to induce, in the minds of others, an interest in the science of electro-magnetism, as he entertained the idea that, ultimately, it would be an instrument of wonderful and highly beneficial results to the world, when it should be more fully understood, its principles developed and applied to practical purposes. On the death of my husband I received from Professor Morse a very kind note of condolence, to which I have often recurred with grateful remembrances, as a token of kind regard from an intimate friend and associate of my deceased husband; I have often spoke of it, and shewn it to my daughter, as coming from an intimate friend of her father. I cannot now state positively that I saw Professor Morse at these lectures before the Athenæum; but from the intimacy that existed between them and the professional relations to each other, I have no doubt that he did attend those lectures. I should have thought it very singular if he had not, and presume that his absence would have been a subject of remark, *at* if he were absent. I recollect Prof. Morse at that time delivered lectures before the Athenæum upon the fine arts, and that my husband and myself attended them. I am very sure that Professor Morse, in his letter of condolence, expressed the pleasure he had had in attending my husband's lectures; and I further depose and say, that the two papers now produced and made an exhibit in this cause, and upon the first page of which I have written my name, and the date of taking of this deposition—one headed "1st, 2d, on electro-magnetism, before New York Athenæum;" the other headed "2d, 3d, 4th, on electro-magnetism, before New York Athenæum;"—are the original lectures delivered by my husband, James Freeman Dana, before the New York Athenæum, in the year 1827; that said original lectures and the drawings therein, as well as the heading to each, above quoted, are in the

handwriting of my said husband, and the same have been in my possession since the death of my said husband; and that my husband, at the time of the delivery, exhibited to his audience various experiments with an electro-magnet, illustrative of the subject-matter of said lectures, and then had and exhibited to his audience an electro-magnet in a horse-shoe form. After his death that identical magnet was sold to his successor, Professor John Torrey. Since the funeral of my husband I have not seen Prof. Morse, until the 19th of Sept., instant. He then, before seeing said lectures, or before I told him what they contained, stated to me several of the experiments which were exhibited by my husband at the time he delivered the same before the Athenæum.

MATILDA W. DAVIS.

Sworn to before me, the 24th day of September, A. D. 1849.

GEORGE S. HILLIARD,
Commissioner, &c., &c., &c.

Deposition of N. J. Bowditch.

Deposition of Nathaniel J. Bowditch, taken under interrogatories copied herein on page 557, to wit:

Deposition of Nathaniel J. Bowditch, of Boston, in the State of Massachusetts, counsellor at law, taken at the office of George S. Hillard.

I am a counsellor at law, residing in Boston; I am one of the trustees of the Massachusetts General Hospital, and was chairman of the committee for preparing the annual report in January, 1848. The subject of the ether discovery was the prominent topic discussed in that report; in an interview which I then had with Dr. Charles T. Jackson, he claimed the discovery to be solely his, and said to me, "I allow of no partnership in this matter. If your report takes from me such a proposition of the sole credit of this discovery as amounts even to the paring of a finger nail, I shall entirely object to it." These were his very words, as written down by me immediately after the interview.

After a long and careful examination of all the published evidence in the case, and of the testimony of twenty-two witnesses, the committee prepared a report, the substance of which is embodied in four propositions, the first of which is as follows: "Dr. Jackson does not appear, at any time, to have made any discovery, in regard to ether, which was not in print in Great Britain some years before."

N. J. BOWDITCH.

Sworn to before me, the 20th day of September, A. D. 1849.

GEORGE S. HILLARD,
Commissioner, &c., &c., &c.

UNITED STATES OF AMERICA,
District of Massachusetts, ss., city of Boston.

On the several days as herein before stated, the aforesaid deponents came before me, and having been by me severally and carefully ex-

amined, cautioned, and sworn to testify the truth, the whole truth, and nothing but the truth, they gave the foregoing depositions, and subscribed the same, which were reduced to writing by me.

These depositions are taken to be used in a civil cause, now depending in the circuit court of the United States, for the district of Kentucky, wherein Samuel F. B. Morse and others are complainants, and H. O'Rielly and others are defendants, and are taken at the request of the plaintiffs. The testimony of the said deponents is necessary in the said cause; and the cause of the taking thereof is, that they live at a greater distance from the place of trial than one hundred miles, and out of the said district of Kentucky. I am not of counsel or attorney to either of the parties, nor interested in the event of the said cause. No notification to the adverse party was first made out and served upon them, or any attorney of them, because neither are within one hundred miles of the place of this caption; and I have retained the said depositions in my possession until sealing them up.

GEORGE S. HILLARD,
Commissioner, &c., &c., &c.

UNITED STATES OF AMERICA,
Massachusetts district, ss.

I, Isaac O. Barnes, clerk of the circuit court of the United States, for the first circuit, Massachusetts district, do hereby certify, that I am acquainted with the handwriting of George S. Hillard, whose name is subscribed to the annexed depositions, and that the said signature of George *O.* Hillard was, at the time of writing the same, a commissioner duly appointed by the said court pursuant to the acts of Congress in cases made and provided "for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States."

In testimony whereof I have hereto subscribed my name and affixed the seal of the said court, this 21st day of September, in the year of our Lord one thousand eight hundred and forty-nine, and in the seventy-fourth year of the independence of the United States of America.

[L. S.]

ISAAC O. BARNES.

Deposition of P. S. Fall, taken under interrogatories copied herein on page 557, to wit:

P. S. Fall's deposition.

Ans. 1. Age 50; profession for 30 years that of a teacher; residence Franklin county, Kentucky.

2. I became acquainted with Morse's electric telegraph in August, 1848; and first saw it in the court-room of the circuit court of the United States in Frankfort.

3. By imprinting signs at a distance.

4. He did not, but Mr. Kendall did at the time and place above stated.

5. Answer as in No. 4.

6. For this I have not had time; I refer to the drawings and descriptions accompanying this.

7. I cannot say.

8. One main circuit and one local circuit in each office.

9. On this subject I can say nothing.

10. I have not.
11. I cannot say.
12. No.
13. I cannot say.
14. No reply.

} See answers at the latter part of the deposition.

15. On this subject I know nothing.

16. The same answer.

17. The same.

18. The same.

19. The same.

20. The same.

21. No.

22. I was for a short time; an instrument called the "Columbian" was exhibited and explained to me by Mr. Kendall; the difference between this and that in the office in Louisville I cannot state, not having seen the latter.

23. I know it only from having seen it as above mentioned.

24. Only as above stated; the instrument mentioned in answer No. 2 was put in operation.

25. I refer to the accompanying drawings and descriptions, upon which my name has been written by me.

26. I consider the principle on which both instruments act to be the same, since neither would operate without a current of electricity communicating a temporary magnetism to soft iron.

27. They produce the same results upon the same principles.

28. The difference between the instruments is in the mechanical detail, and does not affect the essential principle of either; the object of both is to give motion to a point by means of electro-magnetism.

29. If this be the essential principle of both, that patented by Morse must be involved in that of Barnes and Zook.

30. The differences of Barnes and Zook's, from the instrument of Professor Morse, do not in my opinion, although ingenious, constitute any improvement upon the latter, since they do not effect the object had in view at all more readily, nor so simply.

31. The registering instruments differ in this, that motion in Barnes and Zook's is communicated horizontally to a point attached by an arm to an electro-magnet, seated on a frame-work resting on nails, which moves on friction wheels or rollers, and placed between the poles of two permanent magnets; these alternately attract the electro-magnet according as its polarity is reversed, by reversing the current of the local battery. In Morse's motion is produced upwards by inducing magnetism in an armature, to which the lever carrying the pen is

attached; and downwards by a spring which acts when the battery current is broken.

32. They resemble each other in this, that without an electric current neither would act.

33. The mutator in the Columbian consists of helix through which an iron bar moves freely; the registering magnet consists of a helix through which an iron bar is immoveable, in the mutator the helix is fixed; in the register the helix moves with the bar; they agree in being both of them temporary magnets.

34. The register in each instrument imprints the marks on paper; the mutator of the Columbian changes the direction of the current which gives polarity to the magnet of the register, and breaks and closes the two local circuits; and the receiving magnet in Morse's merely breaks and closes the only local circuit necessary to its perfect action.

35. The object attained by each combination is the same, namely, the temporary or continued pressure of the pen upon the paper, and its release from that pressure.

36. It is essential in both; it is the motive power in each.

37. They are not, for the instrument of Morse effects its object without them.

38. They would; the soft iron would become a magnet by induction.

39. The object of the receiving magnet of Morse is, that by breaking and closing the local circuit, the pen may be alternately pressed upon the paper and released. This is also the object of the mutator of the Columbian; but in the latter instrument, as now constructed, the pen could not be released, but by reversing the current which converts the register into a magnet.

40. There is in it no advantage.

41. Certainly it is. A body, on account of its inertia, can move only as it is moved.

42. The Columbian, as at present constructed, could not be worked but by two local circuits; but to Morse's, second local circuits would be a needless addition.

43. Of none that I can perceive; for it merely causes the reversed motion of the register.

44. There is attraction, or a tendency towards each other, undoubtedly.

45. Attraction, but not repulsion, would exist. The soft iron would be converted into a magnet by induction, and would thus answer all the purposes of a permanent magnet, so long as the register was itself a magnet; on breaking the circuit, attraction would cease, and the spring would give the backward motion.

46. The object of both is to mark at a distance, and Morse's arrangement will give any amount of power required.

47. I cannot perceive any advantage that the Columbian has over the other.

48. Both plans are sufficiently convenient, but the Columbian is less simple than the other.

49. Steel is rendered magnetic permanently in many ways, but the most convenient is, by passing a current of electricity around it; sometimes a blow on one end, or permitting it to rest on end on the earth, will effect the object. Magnetism may also be induced by passing other magnets over a bar of steel in a particular way, or simply by contact.

50. By passing a current of electricity around it.

51. Magnetism is the same in nature and in effect, whether permanent, as in steel, or temporary, as in iron. The same length of wire wound in the form of a helix, and along which a current passes, will give the same degree of magnetism to iron and to steel; but in the former it ceases with the current, while it is retained by the latter.

52. Some philosophers deny altogether the existence of repulsion; but it is generally thought that particles or bodies in the same state repel, while those in opposite states attract each other. The one is as much a magnetic force as the other.

53. A motive power is any cause creating or continuing motion.

54. They will; it will be attracted towards that one whose poles are arranged in the reverse order of its own.

55. If the distance of which a force acts be the measure of its intensity, that of attraction is greater than that of repulsion, as may be shown by an instrument called a magnetometer.

56. Two permanent magnets are necessary (if any be used) to make both available at the same moment; while if only attraction is required, none is essential. A piece of soft iron and a spring will, in that case, suffice, or even the spring may be omitted.

57. By attraction it does.

58. Power is obtained for an electro-magnet rather by increasing the number of coils in the helix surrounding the bar, than of the cups in a battery. The same current is increased in intensity by an increased number of coils. Each answers the same purpose as a pair of plates in a battery. The first pair excites all the electricity or determines its quantity; the number of pairs determines the intensity of the current.

59. This would appear to be self-evident.

60. I cannot do so now.

Answer to interrogatory No. 10. I have read the letters patent, together with the specifications, and think that I should have no difficulty *in* in directing the construction of the apparatus therein described, or in using it.

11. I am of opinion that any good workman would be able to construct the apparatus, and that any one acquainted with electro-magnetic manipulations could use it.

12. Answer as in No. 10.

13. Answer as in No. 11.

14. The last named specifications clearly and sufficiently show in what this improvement consists.

Given under my hand, this 29th day of September, 1849.

P. S. FALL, A. M.,

Female Electric Institute, near Frankfort, Kentucky.

STATE OF KENTUCKY, *city of Frankfort, sct.*

This will certify, that in pursuance to the annexed commission, I caused the above named P. S. Fall to come before me, and him diligently examined on oath upon the several interrogatories hereto annexed, the answers to which, wholly in the handwriting of the said deponent, and by him this day subscribed in my presence, are herewith certified, enclosed together with said commission, interrogatories, exhibits, &c. Given under my hand as police judge of the city aforesaid, this 29th day of Sept., 1849.

L. HERD, *P. J. C. F.*

Depositions read on the part of the defendants, to wit:

Interrogatories.

Interrogatories, to wit:

In the case of Samuel F. B. Morse and others vs. Henry O'Rielly and others, in Kentucky district, interrogatories to be asked witnesses on the part of the defendants.

1st. Please to state whatever you may know, if any thing, about the telegraphic instrument called the "Columbian," said to have been invented by Barnes & Zook, and used by the defendants at Louisville when this suit was instituted. Please describe the instrument, if you can do so, and state wherein it differs from the telegraphic instrument or apparatus of said Morse, if there be a difference; and state whether it operates or not by other and different dynamic agents, or by the same; state all you know as distinctly and fully as you can.

2. If you have not been acquainted with said instrument called the "Columbian," look at the instrument now shown you and describe it; or if an instrument be not shown you, look at the drawing shown you, (which please make a part of your deposition,) and say what is identical and what is different as required in the first interrogatory.

3. Please state any thing else you may know of any importance to the respective parties in this cause; state your profession and business of life.

PIRTLE.

A copy—attest:

JNO. H. HANNA, *C. C. C. K. D.*

Cross interrogatories.

Cross interrogatories of complainants.

MORSE et al.
vs.
O'RIELLY.

Cross interrogatories of complainants to defendants' interrogatories to witnesses in U. States.

1. Please state where is your present residence, and where has it

been during the past five years, and whether you have business partners. And if yea, state their names and residence.

2. Have you at any time had, or do you now possess, any legal or equitable interest, actual or resulting, in any invention or patent of an electro-magnetic telegraph? And if yea, to what extent and by whom invented? And please describe it fully and in detail.

3. Please state when and from what source it first came to your knowledge, if ever, that an electro-magnet could be created by means of a galvanic current of a single circuit and intermediate conductor at any considerable distance, and to what distance as the least. If you first derived such knowledge from any publication, please state what it was, and where and by whom made. If from any experiment, state between what points, and by whom and when made.

4. Please state when and where, or between what distant points, and by whom, was the first electro-magnetic telegraph constructed for use, and in conformity to whose invention that came within your knowledge; describe its operation with as much minuteness as you are able, and the character of the signs and signals made by it.

5. If you are acquainted with the invention of the electro-magnetic telegraph known as Morse's system, please state how long you have known it, and wherein each other invention to which you refer in your testimony differs from said Morse's system, minutely and to the best of your ability.

6. Please to state whether, to your knowledge, any person previous to Professor Steinhell, of Münich, ever proposed, attempted, or accomplished the recording of permanent signs at a distance for telegraphic purposes? If yea, state what person, where and when he proposed, attempted, or accomplished the said object, what he performed, and by what instrumentality, means, machinery, or apparatus. Describe the same fully in detail.

MONROE & LOUGHBOROUGH,
For complainants.

Additional Interrogatories.

MORSE and others
vs.
O'RIELLY and others.

In the circuit court of the United States, for the Kentucky district.

Additional interrogatories to be annexed to each list of interrogatories filed by the defendants in said cause.

Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

PIRTLE & JOHNSON.

True copies—attest:

JNO. H. HANNA, *C. C. C. K. D.*

The deposition of Edmund F. Barnes, taken for the purpose of being read in the case of Samuel F. B. Morse and others, against Henry O'Rielly and others, now pending in the 8th circuit court of the United States, in and for the Kentucky district, upon the authority of the annexed commission, and on the interrogatories thereto annexed and herein transcribed, at the office of W. S. Pilcher, commissioner of the said court in the city of Louisville, and State of Kentucky. The deponent, being of lawful age, personally known to the undersigned, and solemnly cautioned and sworn to speak the truth, the whole truth, and nothing but the truth, and to make true and perfect answers to the interrogatories herein, doth depose and say on behalf of defendants. Edmund F. Barnes, was produced by defendants on the 24th day of April, 1849, and made the following answers to the foregoing interrogatories:

To interrogatory No. 1: Please to state whatever you may know, if any thing, about the telegraphic instrument called the Columbian, said to have been invented by Messrs. Barnes & Zook, and used by the defendants, at Louisville, when this suit was instituted; please describe the instrument, if you can do so, and state wherein it differs from the telegraphic instrument or apparatus of said Morse, if there be a difference; and state whether it operates or not by other and different dynamic agents, or by the same; state all you know as distinctly and fully as you can.

Deponent answers: I state that I have knowledge of the Columbian Telegraph; that I have been connected with the invention and development of said telegraph from the time it was claimed to have been invented to the present time. To facilitate the description of said telegraph, reference will be had to a series of drawings made part hereof by reference, and filed herewith, marked E. F. B., No. 1; on this drawing are four plates, numbered numerically from No. 1 to No. 4, inclusive, as plate 1, plate 2, plate 3, plate 4. I begin with plate 2, it being the first in the mechanical series, and which is a view of a galvanic or voltaic battery, so called in honor of two distinguished scientific men, Galvan and Volta. A galvanic battery as at present used for telegraphic purposes, is constructed as follows: into a glass tumbler is put a solution of sulphuric acid, about one part acid to 15 of water, or a solution of sulphate of soda, or even pure water. Into this liquid is immersed a hollow cylinder of pure zinc, (4) open at both ends, and having an arm (B n,) extending above and without the circumference of the tumbler; within this cylinder of zinc is placed a "porous cup," (5) made of clay, baked, but not glazed; into this "porous cup" is put pure nitric acid; depending from an arm (B p,) is a strip of platina, which reaches near the bottom of the "porous cup" of nitric acid; if, now, one end of a wire be brought in contact with the arm (B n,) and the other end connected with the arm (B p,) an electrical circuit will be formed. If, in extending this wire from the bar (B p,) on the positive pole of the battery, to the bar (B n,) on the negative pole of the battery, there be a portion of the wire formed into a

coil, and within said coil there be introduced a bar of soft iron, it will be found that the passage of the electrical current along the wire will have induced magnetism in the iron. If another piece of iron be brought near this magnet, it will be attracted to it, and held with a force in accordance with the power of the battery. If one end of the wire be disconnected from the arm (B p,) or (B n,) the electrical current is interrupted, and the soft iron ceases to be a magnet. Magnetism so induced in soft iron is called electro or temporary magnetism, from the fact that a piece of soft iron may be alternately and rapidly magnetized and unmagnetized. Electro or temporary magnetism is treated as a distinct branch of philosophical science, and the date of its discovery may be known from the following extract, taken from a book called the Library of Useful Knowledge, vol. 2, page 53, on Electro-magnetism, section 149, dated 1832; also philosophical transactions for 1821, page 9; it reads as follows:

"It was discovered both by Sir Humphrey Davy and Mr. Arago nearly at the same time, that the connecting wire of a galvanic battery has a sensible attraction for iron filings, and that it will hold them suspended like an artificial magnet, as long as the electric current circulates through the wire; but the moment the galvanic circuit is interrupted the action ceases, and the filings immediately fall off.

"Section 161, vide.—"Professor Henry, of the Albany academy, in the United States, and Doctor Ten Eyck, employed for the construction of the magnet a soft iron bar, two inches square and twenty inches long, having the edges rounded, bent into the form of a horse-shoe.

"Five hundred and forty feet of copper bill wire were wound round it in nine coils of sixty feet each. * * * * The alternate ends were soldered to a copper cylinder, and the others to a small cylinder of zinc, containing only two-fifths of a square foot, and forming a voltaic arrangement with diluted acid; when the armature of soft iron was placed across the ends of the horse-shoe, it was found capable of supporting 650 pounds; an astonishing effect for so small a battery, which required only half-a-pint of nitric acid. * * * * * *

"In a subsequent experiment, a magnet was wound with 26 strands of copper bill wire, covered with cotton thread, 31 feet long, with a battery nearly five feet square; this electro-magnet suspended 2063 lbs.

"The discovery of electro-magnetism is comparatively of very recent date, as has been seen, and the next important agent in telegraphing to be considered is electricity. Electricity, as applied to telegraphing, is classed under two different heads, namely, static or magnetic electricity, and voltaic electricity; with static or frictional electricity, the world has long been conversant, as will be seen by the following extract, taken from a work called 'Portable Cyclopedia, 2 ed., by C. T. Watkins, A. M.; London, 1814.

Electricity, a term used to denote the operations of a very subtle fluid, which is one of the principal agents in nature. The attractive power which amber and other electric bodies acquire by friction, was long known; and hence this branch of science derives its name from ἤλεκτρον,

(elektron,) the Greek word for amber. The other electric properties were slowly discovered. Mr. Boyle was the first who had a 'glimpse of electric light, as he remarked, after rubbing diamonds, that they afforded light in the dark.' But the principal discovery was made in 1729, by Mr. Gray, who, in an experiment, suspended a piece of metal by silk thread near an excited tube, and found that he drew sparks from it at pleasure; this was the origin of metallic conductors. * * This was soon followed by another improvement, that of forming what is called the electrical battery, by increasing the number of jars, by which means the force is proportionably magnified; hereby the electric matter was conveyed to a great distance—by the French philosophers near 3 miles, and Doctor Watson conveyed it by a wire over the Thames and back again through the river.

Of the power of electricity for practical purposes, developed as early as 1747, is shown by the following extract, taken from *from* Sparks' Life of Franklin, letters to Peter Collins, in Philadelphia, September 1st, 1847, page 204, sect. 21; also page 258, vide:

"On the principle that hooks of bottles (Leyden jars) different[ly] charged will attract and repel differently, is made an electrical wheel, *what* turns with considerable * * * * It goes with great rapidity, and with such strength as that the weight of 100 Spanish dollars, with which we once loaded it, did not seem in the least to retard its motion."

"There are no bounds, but what expense and labor give, to the force man may raise and use in the electrical way."

Voltaic electricity is a discovery of later date, as will be seen by the following extract from the Library of Useful Knowledge, page 2, on galvanism, sect. 3, 1832:

"Professor Volta, of Paris, (in 1800,) see sect. 10, vide, a name already familiar to electricians, was led to the discovery of its properties by deep meditation on the development of electricity at the surface of contact of different metals. We may justly regard this discovery as forming an important epoch in the history of galvanism; and, indeed, since that period, the terms voltaism or voltaic electricity have often, in honor of this illustrious philosopher, been used to designate the particular form of electrical agency."

Since the time that the ancient Greek surprised himself by the simple yet beautiful experiment of producing electricity by friction upon amber, to the present day, history will show that the science has received some important additional discoveries by each succeeding generation, till the stupendous whole is now received as a governing ingredient of all matter, animate as well as inanimate. In many things, static or frictional electricity and voltaic electricity obey the same laws; in others they differ essentially.

Magnetism is also treated of in two distinct branches, namely, magnetism and electro-magnetism; of the discovery of electro-magnetism enough has probably been said. Magnetism may next be considered. The discovery of magnetism is of ancient date, as also is its applica-

tion to practical purposes, especially in reference to the magnetic needle of the mariner's compass. In proof of this is the following extract—see Cyclopedia, or Universal Dictionary of Arts, Sciences, and Literature, by Abraham Rees, D. D., &c. (The date of publication of said work is not given, but, as near as I can approach it, it was 1819 or 1820.)

"Magnet—magnees—the loadstone; also called lapis heraclius, from Heraclia, a city of Magnesia, a part of ancient Lydia, where it was first found, and from which it takes its name. Some derived the word from a shepherd named Magnees, who first discovered it with the iron of his crook on Mount Ida. It is also called lapis nauticus, by reason of its use in navigation; and pidirites, from its attracting iron, which the Greeks called sideros."

"The attractive power of the magnet was known to the ancients, and is mentioned even by Homer, Pythagoras, Aristotle, and by Plato and Eurypides, who call it the herculean stone, because it commands iron, which subdues every thing else."

"The Jews were acquainted with it."

Much more testimony might be brought to show the great length of time which has elapsed since the discovery of all the elementary principles that have been applied to telegraphing; but the foregoing testimony is considered sufficient to establish it; and, in fact, it being a part of history, had not the details been scattered throughout so great a number of volumes as to [have] escaped casual observation, it would not have been considered necessary to introduce it here. It is proper now to inquire how these elements are introduced and made subservient, through the proper medium, to telegraphic purposes. To render the explanation more plain, reference will be had to plate No. 1, 2, 3 and 4, of the aforesaid drawing (marked E. F. B., No. 1.) The instruments having been arranged, and the connexions, by wires, made, as appear in the drawing, let the points of the key (c c) be brought in contact; this produces action in the battery A A A, from which the voltaic current is projected through the bar (B p), or positive, in the direction of the arrow, passing the connected points of the key c c, thence through the coils of fine insulated wire about the spools D D, thence to the arm (B n), or negative pole, thus performing the circuit. In the passage of the voltaic current around the spools D D, the soft iron E becomes charged with magnetism, the positive and negative poles (in position) being opposite to those marked "positive and negative," on the permanent magnet F F. The law being that like poles repel like poles, here presenting themselves to each other, and opposite poles attract, it follows that the armature E is released in a degree according to the amount of magnetism induced in the iron E from the attractive power of the permanent magnet FF, and the action of the spiral spring H is to bring the pendulum Z in contact with the platina point G 1. Thus connecting (as does the key c c, the main circuit) the circuit of "local battery" A a 1. This battery, A a 1, being now in action, the current is projected through

the (B p) in the direction [of] arrow I, along the coil K to the connecting screw 3, on the top of plate 3; thence through the bar z to the platina point, G 1; thence along the wire in the direction of arrow I, to the zinc arm B n, thus performing local circuit (A, a 1.) In the passage of the current about the coil K, the soft iron bar L L becomes charged with magnetism, having opposite poles from, and consequently attracted by, the permanent magnet U 1, U 1, while it is at the same time repulsed and driven from the permanent magnet U 2, U 2. This attraction and repulsion propel the carriage resting upon the bars T, T, T, T, towards the permanent *the permanent* magnet U 1, U 1; thus bringing the metallic point m in contact with the paper n, and indenting it. If now the points of the key c c be connected, the bar E loses the magnetism induced by the current from the main battery, and the bar E is attracted by and drawn towards the permanent magnet F F; thus bringing the bar z in contact with the platina point G 2, thus closing the circuit of "local battery" (A, a 2.) This battery, A, a 2, being in action, the current is projected through the arm B p, in the direction of arrow Y, to the connecting screw 8, in plate 3; thence, through the bar z, to the connecting screw 3; thence, in the direction of arrow Y, about the coil K; thence to the bar B n, of battery A, a 2; thus performing local circuit of local battery A, a 2. It will be observed that, in the passage of the current from local battery A, a 2, the direction is contrary to that from local battery A, a 1, and consequently magnetism is induced in the soft iron L L with contrary poles from that induced by local battery current A, a 1; thus giving the bar L L affinity for permanent magnet U 2, U 2, to which it is attracted, while it is at the same time repelled by permanent magnet U 1, U 1; thus it is seen that a motion is obtained by which a record is produced on the paper N, by the power of two permanent magnets acting upon an electro-magnetized armature, the relative poles of which, compared with those of the permanent magnets, are alternately changed. The two paper rollers O O being revolved by the action of a train of clock work, as shown in sectional drawing, made part hereof, and marked E. F. B., No. 2, with four plates, numbered in the drawing 5, 6, 7, 8. This drawing is the 2d of the series made part hereof by reference.

It follows, that if the key c c be closed and immediately reopened, there is but a dot impressed upon the paper; but if the key c c remain for a time closed, (the paper being in motion,) a line or dash is traced, and combinations of these dots and lines may be used by arbitrary characters to represent letters, from which syllables, words, and sentences may be formed. Having given a description of the telegraphic instrument called the "Columbian," I will now describe the "telegraphic instrument or apparatus of said Morse," by referring to drawing E. F. B., No. 4; by its title, the American Electro-magnetic Telegraph, drawn by J. Samuel Henning, Louisville, Kentucky, lith. of Milne & Bruden, and make the printed description thereon part hereof, by reference thereto; which drawing, with the printed explanation on the lower margin thereof, I believe to be correct; that, from the knowledge I have

of the two "instruments or apparatus," I believe them [to] be essentially different; to what extent, and in what particulars they are so, in form, in structure, and dynamic, the respective drawings, with their accompanying explanations, will show. The powers applied to the two are, in their manner of operation, classed by all scientific writers as separate and distinct.

1st. As to the difference between the receiving magnet of Professor Morse's instrument and the mutator of the "Columbian."

In the receiving magnet of Professor Morse, the passage of the electric current about the coils of wire induces magnetism in the iron within the coils, and consequently the armature D D is attracted forward, carrying with it the arm L L. This Professor Morse styles the motive power of electro-magnetism. In the mutator of the Columbian the passage of the electric current about the coils induces magnetism in the iron E, in such manner as to release it in a degree from the attraction of the permanent magnet F F. Now, if I were to attach a weight to a cord suspended by my hands, and with a pair of scissors sever the string, of course the weight falls. Are the scissors, in this case, the "power" which causes the weight to fall? Most certainly not.

The above simile gives [a] correct idea of the manner in which the mutator is operated upon by the passage of the electric current. The application of the permanent magnet to the mutator of the Columbian is of very great benefit. I do not hesitate to say, that with this mutator, during the summer months, when there is so great a prevalence of atmospheric electricity, a line of telegraphs can be operated, at an average, two hours per day, when communication would be entirely interrupted on a line where Morse's receiving magnet was used. That this is so in fact I personally know. During a period of about one month, from the 14th or 15th of September, 1848, to about the 16th of October of the same year, I conducted the correspondence from and to the Louisville office, for the "People's line," and, during that period of time, numerous thunder storms were experienced, which entirely interrupted the operations of some, and often all, of the four other lines of telegraphic communication branching out from the city of Louisville; one of which is built along the same road of the "People's Telegraph" to Nashville, and which was more frequently interrupted than any other; and during that whole time the People's line, which was operated by means of the Columbian, was not interrupted in a single instance by demonstrations of atmospheric electricity.

The reason of this may be found in the fact, that however much the equilibrium of magnetism may be disturbed by atmospheric electricity traversing the wire, the power of the permanent magnet is instantly employed to restore the equilibrium. The receiving magnet of the instrument used by Professor Morse is destitute of any such controlling power; and it is not at all unusual, during the summer months of the year, that the operations of his instrument are interrupted three or four hours at a time. I have known several instances when communication was necessarily suspended for an entire day, solely from this cause.

There are also in the registers very essential differences. In the instrument used by Professor Morse, the electric current of the local battery, in passing about the coil of the register magnet, F F, induces magnetism in the iron within the coil, and consequently the armature D is attracted, carrying with it the lever L, and bringing the point R in contact with the paper. The retrograde motion has to be obtained by the force of the spring M.

In the register of the Columbian, the passage of the electric current about the coil R induces magnetism in the bar L, giving it affinity for one permanent magnet, to which it is attracted, while it is at the same time repelled by the other; and upon the passage of the current in a different direction, the retrograde motion is obtained from the bar L L, then having received different polarity. To conclude that part relating to the two instruments and their differences, I will state, that the combinations in the electro-magnetic telegraph have been familiar to scientific men since 1824. That the details of experiment after experiment might be produced, shewing the electro-magnet, with the armature, operating in almost every conceivable way; and this same power was so demonstrated years before Pro. Morse even claims to have invented his telegraph. More especially by Professor Henry. That I do not believe, and am satisfied it can be fully shown, that Pro. Morse is not the person who first "combined" the electric circuits, as he claims them in his telegraphic apparatus. That I believe they were first used, and known by Pro. Morse to have been so used, by one Edward Davy, of England, and in combination, to him patented in 1838.

In regard to the Columbian Telegraph, I have never found, in all the details of experiments which I have read or heard of, nor do I believe there can be produced an instance in which the electric current has ever been used to release a piece of iron from the attracting power of a permanent or electro-magnet; nor do I believe there can an instance be found where a reciprocating motion of a bar of iron is produced by a change of polarity, giving said bar alternate affinity for different magnets, between which it was suspended at a point of indifference.

I believe, when they were combined in the Columbian Telegraph, they were new to the world, never before having been used for any purpose whatever.

Interrogatory No. 2. If you have not been acquainted with said instrument called the Columbian, look at the instrument and describe it; or, if any instrument be not shown you, look at the drawing shown, (which please make a part of your deposition,) and say what is identical and what is different, as required in the first interrogatory.

Deponent answers: Being acquainted with the Columbian Telegraph, I suppose this interrogatory to be fully answered by my answer to interrogatory No. 1.

Interrogatory No. 3. Please state anything else you may know of any importance to the respective parties in this cause. State your profession and business of life.

Answer of deponent: My profession and business of life is that of a

telegraphist. The balance of my answer to this question will be found under the general question at the end of the additional interrogatories herein filed by defendants.

Cross interrogatories of complainants to defendants.

No. 1. Please state where is your present residence, and where has it been during the past five years; and whether you have business partners; and if yea, state their names and residence.

Deponent answers: I reside at present in Louisville, and for the five years last past in the State of N. York, except about one year, I resided in the city of Cincinnati, Ohio. I have business partners, whose names are Stephen Porter and Samuel Porter, residing in Geneva, N. York, and Samuel K. Zook, now of New Orleans, Louisiana.

No. 2. Have you at any time had, or do you now possess, any legal or equitable interest, actual or resulting, in any invention in patent of an electro-magnetic telegraph; and, if yea, to what extent and by whom invented? And please describe it fully and in detail.

Deponent answers: I do not; nor have I ever possessed any interest whatever in any telegraph whatever, except in that of the Columbian Telegraph, which, in connexion with Samuel K. Zook, I claim to have invented; and, for the use of which by another, I have never entered into any agreement whatever with any one; nor have I ever received ought in payment for its use, or applied therefor.

No. 3. Please state when and from what source it first came to your knowledge, if ever, that an electro-magnet could be created by means of a galvanic current of a single circuit, and intermediate conductor at any considerable distance, and to what distance as the least.

If you first derived such knowledge from any publication, please state what it was, and when and by whom made; if from any experiment, state between what points, and by whom and when made.

Deponent answers: "It never came to my knowledge" from any source whatever, "that an electro-magnet could be created" by "means of a galvanic current," a single circuit, and intermediate conductor, nor do I believe it ever came to the knowledge of any one; if so, it must be a feature in philosophical science that has escaped my observation. I do not, however, suppose that the writer of the question says what he means. I presume he intends to ask when it came to my knowledge that magnetism could be induced in iron by means of a current of electricity, projected through or about a coil of wire, within which the iron (should be) or is intersected. If so, I answer, I think I derived the information from Comstock's Philosophy, which I made a study at school some ten years since, that temporary magnetism could be induced in soft iron by an electric current projector about a coil of wire that should encompass the iron. I did not first derive my knowledge from any experiment; after studying Comstock as aforesaid, the following extract fell under my observation; it is from a work entitled the American Electro-magnetic Telegraph, &c., &c., by Alfred Vail, pages 133, 134, 1847: "On the 25th of September, 1820, Mr. M. Arago communicated to the

French Institute the important discovery that the electric current possessed in a very high degree the power of developing magnetism in iron or steel. Sir Humphrey Davy communicated a similar fact to Dr. Wallaston on the 12th of November, 1820; and Dr. Lubeck laid before the Royal Academy of Berlin a series of experiments on the same subject. * * * *

"In the year 1820 Ampore predicted the possibility of making the deflection of the magnetic needle, by the agency of the galvanic fluid, serve the purpose of transmitting intelligence."

In page 19 of his memoir he thus resolves the problem:

"As many magnetic needles as there are letters of the alphabet, which may be put in action by conductors, which may be made to communicate successively with the battery by means of keys, which may be pressed down at pleasure, might give place to a telegraphic correspondence which would surmount all distance, and would be as prompt as writing speeches to transmit thought. The next step in the progress of discovery was that of making magnets of extraordinary power by means of a galvanic battery; this seems to have been first accomplished by Professor Moll, of Utrecht, and Professor Henry, of Princeton, who was able to lift thousands of pounds weight by his apparatus."

Interrogatory No. 4. Please state when and where, or between what distant points, and by whom, was the first electro-magnetic constructed for use, and in conformity to whose invention, that came within your knowledge. Describe its operation with as much minuteness as you are able, and the character of the signs and signals made by it.

Deponent answers: The first suggestion for a strictly electro-magnetic telegraph that has come to my knowledge is that made by Amphero in 1820. The first telegraph operated upon the electro-magnetic principle, of which I have had knowledge, was that of Councellor Goup & Brother; Wm. Wiber, invented at Gottingen, 1833, the deflection of the magnetic bar, by means of the multiplier, through the agency of the galvanic fluid, excited by the magnetic electric machine, was the basis of their plan.

The description and drawings of which are made part hereof, by reference in the work styled the American Electro-magnetic Telegraph, by Alfred Vail, from pages 156 to 159 inclusive.

Cross interrogatory No. 5. If you are acquainted with the invention of the electro-magnetic telegraph, known as Morse's system, please state how long you have known it, and wherein each other invention to which you refer in your testimony differs from said Morse's system, minutely and to the best of your ability.

Deponent answers: I am acquainted with the electro-magnetic telegraph, known as Morse's instrument or apparatus, having been practically connected with its operation since April, 1846. To point out the differences of feature in these children of common parent electricity would take five hundred pages of deposition. I refer to my answer to question No. 1 in chief, for the difference existing between the two instruments there indicated as in contest here, and to what I shall say

in answer to the additional interrogatories of defendants herein as to other systems, for a full answer to this 5th cross question.

Cross interrogatory No. 6. Please to state whether to your knowledge any person previous to Professor Steinhiel, of Munich, ever proposed, attempted, or accomplished the recording of permanent signs. If yea, state what person, where and when he proposed, attempted, or accomplished the said object, what he performed, and by what instrumentality, means, machinery, or apparatus. Describe the same fully and in detail.

Deponent answers: To the best of my knowledge, Dr. Steinhiel was the first to invent an instrument to record telegraphically, although a telegraph had been invented in 1816, to point out the Roman letters already recorded, of which I will hereafter take further notice in this deposition. A description of Dr. Steinhiel's telegraph with drawings may be found in page 179 to 182, in Vail's book before referred to; with this correction, that instead of being a magnetic electrical telegraph, as it is styled by Mr. Vail, it is purely an electro-magnetic telegraph, operated entirely by the motive power of electro or temporary magnetism.

Additional interrogatories, annexed to each list of interrogatories, filed by the defendants in this cause.

Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination on the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

Deponent answers: Premising that the main object of a telegraph is the speedy transmission of intelligence, I will give a list of telegraphs, with references to descriptions and drawings, in the order I believe them to have been brought to a state of utility, or to be called inventions, so far as they have come under my notice.

I have found it impossible to trace the date of the first "idea" of a telegraph; but the following will, probably, be sufficient to show it is not of very recent origin.

See Encyclopedia or Dictionary of Arts, Sciences, and Miscellaneous Literature, first American edition, vol. 18, 1798.

"TELEGRAPH is the name very properly given to an instrument by means of which information may be almost instantaneously conveyed to a considerable distance. The telegraph, though it has been generally known and used by the moderns only for a few years, is by no means a modern invention. There is reason to believe, that amongst the Greeks there was some sort [of] telegraph in use. The burning of Troy was certainly known in Greece very soon after it happened, and before any persons had returned from thence; a Greek play begins with a scene, in which a watchman descends from the top of a tower, and gives the information that Troy was taken. I have been looking

out these two years (says he) to see when that would happen, and this night it is done. Of the antiquity of a mode of conveying intelligence quickly to a great distance, this is certainly proved. * * * *

"In the year 1663, the Marquis of Winchester in his 'Century of Inventions' affirmed that he had discovered a method * * * by means of which a correspondence could be carried on by night as well as day, though as dark as pitch is black. * * * It was not, however, till the French revolution that the telegraph was applied to useful purposes * * * * by the system said to have been invented by Mr. Chappe, and used by the French about the end of 1793."

There are in the work descriptions of several different systems of telegraphing dependent upon optics. I will now notice the first application of electricity for telegraphic purposes which has come under my observation, namely:

"Lamond's Electrical Telegraph," spoken of in Young's Travels in France, 4th edition, vol. 1, page 79, year 1787; see also Vail's book before referred to, page 121; next comes Reizen's Electric Spark telegraph, used in 1794; see also Vail's book, 121, 123, for description and drawings.

Following this comes Doctor Salva's Electric Spark telegraph, 1798, see page 123, vide; this is probably the same spoken of by Dr. Steinhiel in the account he gives of his own telegraph, in which he says, "Goup mentioned a communication from Humboldt according to which Ballancourt, in 1798, established a communication between Madrid and Aranjuez, a distance of 26 miles, through which a Leyden jar used to be discharged, which was intended to be used as a telegraphic signal."

These last two plans, (Reizen and Doctor Salva,) I suppose to have been on about the same basis as that contemplated by Professor Morse until 1837, as I learn from an extract of a letter from S. F. B. Morse to the Hon. Levi Woodbury, Secretary of the Treasury, dated 27th September, 1837, to be found near the top of page 70, of Vail's book before referred to, and which is made part hereof by reference.

Reizen and Doctor Salva telegraphed in 1798, by making the presence of electricity visible in a desired part of the circuit, and thus produced a system of signs by which intelligence could be instantaneously transmitted. This is, in my opinion, of said extract in Vail's book, precisely, what "occurred" to ("me") Professor Morse about five years before the date of his said letter to Mr. Woodbury, and by him theoretically entertained until within "a few weeks" of the date of that letter.

Samuel Thomas Sœmmering's Voltaic Electric telegraph, invented in 1809, is next in the series of inventions for description and drawings. See Vail's book, page 126 to 128. Next in order comes Ronald's Electric telegraph, invented in 1816. Ronald's system, in its operation, brought to view as records (the Roman letters) already made, see Vail's book aforesaid, pages 130, 131.

Tribouille *is* "proposition" and Feckner's "suggestion" may be

found in page 135, same work. "The multiplicators" spoken of by Feckner were first constructed by Prof. Schweigger, of Halle, very soon after the first discovery of electro-magnetism, (1819,) and by him called "electro-magnetic multipliers." This multiplication principle was applied to soft iron, (the electro-magnet,) by Professor Henry, then of Albany, late of Princeton college, now Sec'y [of the] Smithsonian Institution, and the utility of the electro-magnet was by him developed, and now composes the entire basis of Morse's Electro-magnetic Telegraph. A drawing shewing Schweigger's electro-magnetic multiplier, with an explanation thereon, is hereto attached and made part hereof.

Baron Schilling experimented telegraphically; his apparatus is next in the order of invention. He operated in the presence of the Emperor of Russia in 1832 and 1833, but the death of the baron soon after, put an end to the more extended development of his system.

For further description of the invention, see Vail's book, page 155, 156. Goup and Wilber invented and operated a telegraph in 1833, of which extended mention is made in same book, page 156 to 159.

Wheatstone patented his invention of the electric telegraph in 1837; for description and drawings of which see Vail's book aforesaid, 171 to 179.

Doctor Steinhiel erected between Munich and Bogenhausen an electro-magnetic recording telegraph in 1837, on the basis of Schweigger's multiplied coil for the deflection of the needle, a description of which, with drawings, may be found at pages 179 to 182 of Vail's book. Several more systems might be quoted, but one more will suffice. Edward Davy's "electric telegraph," more properly, electro-magnetic telegraph, (as the basis of it is purely so,) using the multiplier and combined circuit, patented July 4th, 1838, a description of which, with drawings, may be found on page 187 to 199 of Vail's book. It may not be improper here to state, that Mr. Vail, the author of the said work from which I have so liberally quoted, and which, for the purpose of the said quotations and references is made part hereof, was at the time of the publication of said work, and now is, a partner of Prof. Morse, and a party to this suit.

Morse's Electro-magnetic Telegraph. The one in contest in the suit will now be spoken of, this being the proper place in the series to note it.

The accounts respecting the system of telegraphing, so far as regards the proper date of its development, to the time it assumes a form that would entitle it to the name of telegraph, are so confused and contradictory, as to render it impossible to speak of the real date of its invention. Prof. Morse says that he cast some type in 1832, but then he seems to have abandoned the scheme altogether for five years, or at least to have regarded it as a creation of the fancy, which he was unable to bring into practical use. To enable myself, however, to approximate as near the true date as possible, I will refer to letters written by Professor Morse himself, as also by others. Professor Morse was again aroused to the contemplation of the telegraph by a "circular to certain

collectors of the customs, commanders of revenue cutters, and other persons," issued from the Treasury Department March 10, 1837. This circular is found in Vail's book, pages 68, 69. A reply to this circular was made by Professor Morse on the 27th Sept., 1837, which is also found on pages 69 to 73, same book. From this letter it will be seen that the electrical experiment "of Franklin, (so called by Professor Morse, when in truth and in fact Franklin made no such experiment, but the same was made by William Watson, F. R. *R.* S. at Shooter's hill, England, 1747,) upon a wire some four miles in length," (this also is a mistake of Professor Morse; the wire was, in fact, but two miles in length, the return circuit being 2 miles through the ground, making the four miles,) was casually called to Professor Morse's mind in a conversation with one of the passengers, Professor C. T. Jackson, of Boston, and it "immediately occurred to him (as it had to Reizin and Doctor Salva in 1794 and 1798) that, if the presence of electricity could be made visible in any desired part of this circuit, it would not be difficult to construct a system of signs by which intelligence could be instantaneously transmitted."

This thought took strong hold of Professor Morse's mind; so much so, that he cast a species of type the first week after his arrival home, but was compelled to postpone further "experiment," until within a few weeks of Sept., 1837 (the date of the letter). These "few weeks'" experiments seemed to have satisfied Professor Morse that the suggestion of Professor Henry (in Silliman's Journal, 1831) of the feasibility of the application of the electro-magnet to telegraphic purposes was a good one, and he adopted it as the basis of his system. Thus for the first time, as I believe and state, did he receive the "idea" of what has since expanded into the "American Electro-magnetic Telegraph.

That I am not alone in this belief, reference is made to an extract from a letter by Prof. Henry to Professor Morse, dated Feb'y 24th, 1842, to be found on page 88 of Vail's book aforesaid? Professor Henry says in that letter "about the same time with yourself, Professor Wheatstone, of London, and Dr. Stienheil, of Germany, proposed plans of the electro-magnetic telegraph. Wheatstone and Steinhiel's telegraphs were established in 1839, and Professor Morse himself states in a letter to the Hon. C. G. Ferris, dated New York, December 1842, and found at page 95 of Vail's book aforesaid. "That the two European telegraphs in practical operation are Professor Steinheil's, of Munich, and Professor Wheatstone's, of London; the former is adopted by the Bavarian Government; the latter is established about 200 miles in England, under the direction of a company in London."

The first announcement of the completion of the first section of telegraph ever constructed under Morse's system may be found in a letter from Prof. Morse to the Hon. McClintoch Young, dated Washington, June 3d, 1844, to be found on pages 98 to 101 inclusive, in Vail's book aforesaid; Professor Morse did not seem himself to be satisfied of the practicability of establishing his telegraphic system till the summer of

1842, as is shown by reference to a portion of a letter from Professor Morse to Hon. C. G. Ferris, dated December 6th, 1842, to be found commencing on page 91, and ending on page 92 of said Vail's book. I therefore believe and state, that Prof. Morse satisfied himself of the practicability of his telegraphic system in 1842, and proved it to the world in 1844, by constructing and operating a line between the cities of Washington and Baltimore, under the exposure to the vicissitudes of the weather.

I make part of this deposition a small book entitled "The Mural Diagraph, or the art of conversing through a wall, by James Swain." Published Phila., 1829.

This book shows a system of dots and dashes, used as arbitrary signs to communicate intelligence diagraphically, *employing*, employing the same elements as are employed by Professor Morse in his "system of signs," although different combined; and further saith not.

EDMUND F. BARNES.

UNITED STATES OF AMERICA,
8th circuit, Kentucky district, city of Louisville, ss:

I, William S. Pilcher, commissioner of the United States, in and for the said circuit and district, residing in the city of Louisville, duly commissioned and acting as such, certify, that the above named witness, Edmund F. Barnes, having been by me duly sworn, cautioned, and examined, did, at the place and at the time stated in the caption, begin to depose and give the above answers, and no more, to the several interrogatories so propounded to him, and continued his answers at the same place without delay, until the evening of the 26th of April, 1849, being three days, when the same were fully completed; and was signed by the witness after a careful examination and reperusal of the several answers, on the morning of the 27th of April, 1849. I further certify, that the interrogatories were transcribed by myself, and that the entire evidence so given was wholly reduced to writing by myself in the presence of said witness, and thereupon read carefully by me to him, and by him subscribed in my presence. I further certify, that I have caused to be carefully rolled and endorsed, drawings marked (E. F.B.,) No. 1, 2, 3, made part of deposition, and No. 4 descriptive of No. 1, and Nos. 2 and 3. No. 1 being drawing of the Columbian, and No. 4 of Morse's instrument. No. 5 and 6 being two books, part of the deposition, properly marked, and all herewith returned. I further certify, that I am not akin to or counsel of either of the parties, or in any wise interested in the controversy.

Given under my hand at the city of Louisville, Kentucky, this 27th day of April, 1849.

W. S. PILCHER,
Commissioner.

Interrogatories.

In the case of Samuel F. B. Morse and others vs. Henry O'Rielly, and others, in the United States 8th circuit court, Kentucky district, interrogatories to be asked witnesses on the part of the defendants.

1. Please to state whatever you may know, if any thing, about the telegraphic instrument called the "Columbian," said to have been invented by Messrs. Barnes and Zook, and used by the defendants at Louisville when this suit was instituted; please describe the instrument if you can do so, and state wherein it differs from the telegraphic instrument or apparatus of said Morse, if there be a difference; and state whether it operates by other and different dynamic agents, or by the same; state all you know as distinctly and fully as you can.

2. If you have not been acquainted with said instrument called the "Columbian," look at the instrument now shown you and describe it; or if an instrument be not shown you, look at the drawing shown you (which please make a part of your deposition,) and say what is identical, and what is different, as required in the first interrogatory.

3. Please state any thing else you may know of any importance to the respective parties in this cause. State your profession and business of life.

4. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

PIRTLE & JOHNSON.

Cross interrogatories.

Cross interrogatories of complainants to defendants' interrogatories to witnesses in the United States.

1. Please state where is your present residence, and where has it been for the last five years, and whether you have business partners, and if yea, state their names and residence.

2. Have you at any time had, or do you now possess, any legal or equitable interest, actual or resulting, in any invention or patent of an electro-magnetic telegraph; and if yea, to what extent and by whom invented? And please describe it fully and in detail.

3. Please state when and from what source it first came to your knowledge, if ever, that an electro-magnet could be created by means of a galvanic current of a single circuit and intermediate conductor, at any considerable distance, and to what distance at the least.

If you first derived such knowledge from any publication, please state what it was, and where and by whom made; if from any experiment, state between what points, and by whom and when made.

4. Please state where and when, or between what distant points, and by whom, was the first electro-magnetic telegraph constructed for use, and in conformity to whose invention, that came within your knowledge. Describe its operation with *its operation with* as much minuteness as you are able, and the character of the signs and signals made by it.

5. If you are acquainted with the invention of the electro-magnetic

telegraph known as Morse's *statement*, please state how long you have known it, and wherein each other invention to which you refer in your testimony and to the best of your ability.

6. Please to state whether to your knowledge, any person, previous to Prof. Steinhiel, of Munich, ever proposed, attempted, or accomplished the recording of permanent signs at a distance for telegraphic purposes. If yea, state what person, where and when he proposed, attempted, or accomplished the said object, what he performed, and by what instrumentality, means, machinery, or apparatus. Describe the same fully and in detail.

MONROE & LOUGHBOROUGH,
For complainants.

The deposition of Samuel K. Zook, taken to be read in the case of Samuel F. B. Morse, &c., against Henry O'Rielly and others, defendants, now depending in the United States circuit court, for the 8th circuit and Kentucky district, by authority of the annexed commission addressed to any justice, &c., but executed by William S. Pilcher, the commissioner in and for said district, on the interrogatories thereto annexed and herein transcribed, on the 1st day of October, 1849, at the office of the said commissioner in the city of Louisville, in the State of Kentucky.

Deponent being of lawful age, personally known to me, the said William S. Pilcher, commissioner aforesaid, and solemnly cautioned and sworn to state [the] whole truth, and to make true and perfect answers to the several interrogatories propounded to him in this case, and having been duly examined, deposes and states, in answer to defendants' said interrogatories, as follows:

Interrogatories No. 1 and 2 are waived by defendant to this witness, and he is first to answer

Interrogatory No. 3. Please state any thing else you may know of any importance to the respective parties in this cause. State your profession and business in life.

Deponent answers: I will answer the first clause of this question in my answer hereinafter given to interrogatory No. 4; and to the 2d clause of this question I state, that I am a telegraphist by profession, and I follow that as my business in life.

Interrogatory No. 4. Do you know, or can you set forth, any other matter or thing which may be a benefit or advantage to the parties at issue in this cause, or either of them, or that may be material to the subject of this your examination, or the matters in question in this cause? If yea, set forth the same fully and at large in your answer.

Deponent answers: I commenced telegraphing on the 6th of January, 1846, in the city of Philadelphia, and continued in the constant use of the telegraphic instrument known as "Morse's Electro-magnetic Telegraph," in that and other cities, until the 11th of February, 1848 Since which time I have been in almost daily use of the telegraphic instrument known as the "Columbian Telegraph." I believe myself

to be perfectly familiar with the operations of each, and the principles governing them, and from what I know of the two, I believe them to differ essentially. The "electro-magnetic telegraph of Prof. Morse is, as he claims, operated solely by the motive power of "electro-magnetism." Now, if an electro-magnet be made by passing a current of electricity through coils of wire about a piece of soft iron, and an armature of soft iron approximated to its poles, the armature is attracted to the magnet; but the moment that the current of electricity is interrupted magnetism ceases, and the armature is released; and whichever direction the current of electricity may be passed the effect is the same. Thus, in "Morse's Electro-magnetic Telegraph" no change, in effect, is produced by changing or reversing the current on either the receiving or register magnet, or on both. Now, remove the soft iron armature and substitute one of magnetized steel, and approximate the steel armature to the electro-magnet in such a manner that the like poles present; and, instead of attraction, repulsion will take place, showing a contra principle or rule of action. This constitutes one of the differences between the "Electro-magnetic Telegraph" of Morse, and the "Columbian Telegraph," as used by O'Rielly. Now let us examine the object of this principle of permanent magnetism, of attraction and repulsion, as found in the "Columbian" instrument. The comparative uselessness of Professor Morse's "Electro-magnetic Telegraph" (from the day when his receiving magnet weighed several hundred pound to the present,) during demonstrations of atmospheric electricity, has been a very serious detriment to the practical operations of his instrument. To my knowledge Professor Morse was aware of this detriment, and in the summer of 1847 attempted a remedy for it, and failed to do so; one of the ends gained by the "Columbian Telegraph" is the remedy of this difficulty. When operating in Philadelphia and Cincinnati on Morse instruments, interruption from atmospheric electricity were frequent. While in New Orleans, and other southern cities, where storms are more prevalent, no interruptions were offered to the working of the Columbian instrument from that cause; and its work was only suspended when it was necessary to withdraw the instrument itself from operation, to prevent the coils of wire from being melted by the intense discharge of the atmospheric electricity. I will briefly [state] the reason for this: Atmospheric electricity is extremely intense, and when it is discharged through the coils of an electro-magnet, a current of magnetism of corresponding intensity is induced in the soft iron; if the armature approaching to it be soft iron, magnetism is developed in it by induction, and some time must be permitted to elapse before the surcharge goes off, and the magnet is worked by the proper force of the battery. The flashes of atmospheric electricity occurring at short intervals, during a storm, renders it impossible to preserve the adjustment of the instrument; consequently, communications must be temporarily suspended. This difficulty is entirely overcome by the introduction of the permanent magnet into the mutator of the "Columbian." To

render the reason of this plain, I will here state, that to induce magnetism in soft iron is very easy, but to induce it in steel is quite difficult. It must be noticed, in the "Columbian," that the quantity of soft iron used is small when compared with the steel of the permanent magnet. If a current of atmospheric electricity be projected through the coils of the mutator, then, owing to the smallness of the quantity of soft iron within the coils, the magnetism induced in it is insufficient to change the magnetism or polarity of the steel or permanent magnet, (an inspection of the machine itself will show the position and relation of the soft iron within the coils to the steel permanent magnet.) As equilibrium is an immutable law of magnetism, it follows that the magnetism of the soft iron is curtailed by the permanent magnet, and the equilibrium is preserved, or when impaired is instantly restored, and the operation of the instrument not retarded. I mention another distinctive difference between the two instruments. For the purpose of producing the proper result, in the "Columbian," the positions of the two local batteries are such, to the register armature, that a current from one is projected in one direction, and from the other in the opposite direction, through the coil about the armature. To reverse this movement, or to send the currents in the same direction, entirely defeats the object; when the local batteries, as in the "Columbian," are properly arranged, the main battery is so placed that its current bears a certain relation to the direction of the currents of the local batteries, otherwise the effect would be to obtain a record when the key, which closes the main circuit, is open, and when the key is closed to obtain a blank. With Morse's Electro-magnetic Telegraph" these requisites do not exist. In that instrument the direction of the current of the main battery need bear no relation to the iron of the magnet or of the armature, nor to the direction of the current of the local battery.

Cross interrogatories of complainants to defendants' interrogatories to witnesses examined thereon.

Cross interrogatory No. 1. Please state where is your present residence, and where has it been during the past five years; and whether you have business partners; and if yea, state their names and residence.

Deponent answers: My present residence is at the different points along O'Rielly or "People's line" of telegraph, from Louisville to New Orleans, superintending its operations, and remaining longest at such point as my services are most needed, and I have been so engaged and so residing since the month of February, 1848. From January, 1846, until that time, as before stated, I resided in the cities of Philadelphia and Cincinnati, and was employed by a practical operator and superintendent in the telegraph offices and on the lines. Before that time I resided with my father in Montgomery county, in Pennsylvania, and most of the time was employed upon his farm. So far as myself and Edmund F. Barnes jointly contributed to the invention called the "Columbian Telegraph," it may be said that he is my business part-

ner, but outside of this I have no partnerships of any kind. Edmund F. Barnes resides in Louisville, and, as I learn, has given his deposition in this cause.

Cross interrogatory No. 2. Have you at any time had, or do you now possess, any legal or equitable interest, actual or resulting, in any invention or patent of an electro-magnetic telegraph; and if yea, to what extent, and by whom invented? And please describe it fully and in detail.

Deponent answers: I possess no interest in any telegraph, except the "Columbian," for the use of which, by another, I have never made any contract, or any arrangement by which I am to use it for a price; as I learn that E. F. Barnes, my co-inventor of this instrument, has given a full description of it in his deposition herein, based on drawings and explanations thereon, I refer to his description and make it my own, satisfied that it cannot materially differ from any I might be enabled to give, had I the drawings to present, or the instrument itself before me in presence of the court. It is proper to say that this "Columbian Telegraph" is the joint invention and the joint property of myself and said Barnes, and is called the instrument of Barnes & Zook.

Cross interrogatory No. 3. Please state when and from what source it first came to your knowledge, if ever, that an electro-magnet could be created by means of a galvanic current of a single circuit and intermediate conductor at any considerable distance, and to what distance at the least. If you first derived such knowledge from any publication, please state what it was, where, and by whom made. If from any experiment, state between what points, and by whom and when made.

Deponent answers: I find it necessary, from the obscurity of the meaning of this question, first to guess, before I can make an answer to it. If I guess its meaning rightly, I say that the first knowledge I received about a telegraph at all was in 1844, on the line between Washington and Baltimore, and learned, from the instrument used then practically, that an electro-magnet could be produced by current of electricity flowing through a conductor of considerable length. Before that time I had the theory, in the verbal lectures of a man named Coggins, delivered in Montgomery county, Pennsylvania, in the winter of 1842. Coggins did not fix the distance. I did not derive the knowledge from any publication or book. The experiments were, as aforesaid, on Morse's line between Baltimore and Washington city. Since that time I have heard, in conversations with Professor Henry, that he had made experiments on the subject many years ago, by wires stretched on the ground at Princeton college, and satisfied himself of the practicability of conveying intelligence by electro-magnets at a distance; and I think he said he did so before Professor Morse commenced experimenting on his telegraph, and expressed his convictions on the subject to the students of the college.

Cross interrogatory No. 4. Please state when and where, or between what distant points, and by whom, was the first electro-magnetic telegraph constructed for use, and in conformity to whose invention that

came within your knowledge. Describe its operation with as much minuteness as you are able, and the character of the signs and signals made by it.

Deponent answers: The first telegraph I ever saw in operation, was between New York and Philadelphia in January, 1846, operated on by Morse's telegraphic instrument. This was the first telegraph, constructed for use, that was known to me. I had heard of the one between Washington and Baltimore, but had never seen it at that time. I refer to the deposition of E. F. Barnes herein for a full description of Morse's instrument. The signs and signals used then are the same as those ever since and now used in Morse's telegraph.

Cross interrogatory No. 5. If you are acquainted with the invention of the "Electro-magnetic Telegraph," known as Morse's system, please state how long you have known it, and wherein each other invention to which you refer in your testimony differs from said Morse's system, minutely and to the best of your ability.

Deponent answers: I have been acquainted, as above stated, practically with Morse's system since January, 1846. I have referred herein only to the "Columbian instrument." I refer to my answer to the general interrogatory in chief, put by defendants, to mark the differences between it and the system or instrument of Morse. The signals used in both instruments are, in elements, the same dots and lines; but they differ in the Columbian in combination from the combination used by Morse.

Cross interrogatory No. 6. Please to state whether, to your knowledge, any person, previous to Professor Steinhiel, of Munich, ever proposed, attempted, or accomplished the recording of permanent signs at a distance, for telegraphic purposes. If yea, state what person, when, and where he proposed or accomplished the said object; what he performed, and by what instrumentality, means, machinery, or apparatus; describe the same fully and in detail.

Deponent answers: I never knew, and never read, of any persons doing so previous to Professor Steinheil's having effected it at a distance of 6 or 7 miles. Professor Steinhiell's experiments were made in 1837, but I don't recollect in what month of that year, and can't now remember whether these efforts of Steinhiel preceded those of Professor Morse in the same year, made within a building to impress signs for telegraphic purposes.

And further saith not

S. K. ZOOK.

UNITED STATES OF AMERICA,
8th circuit, Kentucky district, city of Louisville, Kentucky, ss:

I, William S. Pilcher, commissioner of the United States for the 8th circuit, and Kentucky district, duly commissioned, and acting as such by virtue of the annexed commission placed in my hands to execute, from the circuit court in and for said circuit and district, certify, that the above named witness, Samuel K. Zook, having been by me duly

sworn, cautioned, and examined, did, at the time and place stated in the caption, depose and give the above answers, and no more, to the several unvaried interrogatories propounded in chief for the defendants; and the above answers, and no more, to the several cross interrogatories propounded to him for the complainant; and that the evidence so given having been wholly reduced to writing by me in the presence of the witness, and thereupon read by me to him, was so subscribed by him in my presence; and that I am not akin to, or counsel of either of the parties, or in any wise interested in the controversy.

Given under my hand at the place aforesaid, this 1st day of October, 1849, the day stated in the caption.

W. S. PILCHER, *Commissioner.*

Deposition of C. T. Smith.

I, Charles T. Smith, of Nashville, in the State of Tennessee, now *commorant* in Portland, in the State of Maine, aged 28 years, on oath depose and say, in answer to interrogatories, as follows:

Interrogatory first, by Henry C. Lord, on the part of the defendants. What is your occupation; how long have you been thus engaged?

Answer. I have been a telegrapher for four years past; I commenced at Washington on the experimental line.

Question 2d. [State] whether or not you have any knowledge in relation to the magnets originally used for the telegraph line; if so, state all that you know, who made them, who invented or devised them; what, if anything, was paid for the privilege of using them; by whom, if at all, were they furnished to Henry O'Rielly for the use of the lines constructed by him.

Answer. I know all about them; the first magnet we used on the experimental line of Morse and others weighed nearly three hundred pounds, including the case; after that a magnet was used invented by Charles G. Page, examiner of patents at Washington; subsequently the magnet invented by Page was discarded, and a smaller one, weighing from two to three pounds, was substituted, which was the same in principle as the one now in use on the lines of Professor Morse.

Professor Morse claims the invention of the form of magnet first and last described.

While we used Page's magnet the size of it was reduced from 300 to 75 pounds. I made the Page magnets myself; they were furnished to Henry O'Rielly for the use of his lines, at first by Professor Morse and Alfred Vail, and subsequently by machinists in different parts of the country. I don't know what sum was paid for the privilege of using them.

Interrogatory 3d. Was the form of magnets invented by Charles G. Page, to which you alluded in your former answer, used for what is called Morse's telegraph, and did the magnets constitute a vital part?

Answer. They were; they did constitute a vital part; without the magnet the line could not be worked.

Interrogatory 4th. State whether or not there was any essential dif-

ference in principle between the magnet invented by Charles G. Page and the third form of magnet used by Professor Morse, and which he claimed to have invented?

Answer. I don't know that there was any difference in principle; I should think the principle was the same.

Interrogatory 5th. State whether you have worked on the lines of S. F. B. Morse's telegraph; if yea, state when, and how long, and what stations you held on different lines worked by Morse's telegraph?

Answer. I have; I first commenced in the office of the experimental line at Washington, in the summer of 1845, as a learner. On the extension of the line from Baltimore I took the station of chief operator and superintendent at Philadelphia; on the extension of the line to New Ark, New Jersey, I went there in the same capacity; on the completion of the line to New York I went there and set up the instrument, and from there I went to Fort Lee, and had charge of that office until the line was completed to Jersey City; I was then appointed chief operator at that station, and so continued about the month of March, A. D. 1847.

Interrogatory 6th. State whether or not you have been engaged on lines worked by Barnes and Zook's Columbian Telegraph; if so, state when and how long?

Answer. I have; during most of the last year in Tennessee, Kentucky, Alabama, and Mississippi.

Interrogatory 7th. State whether or not the powers [by] which Morse's telegraph and the Columbian Telegraph are moved, are essentially different; and if yea, describe the difference.

Answer. They are essentially different; one being purely an electro-magnetic movement, the other an action produced by a change of polarity between one or more permanent magnets; and the Columbian being an improvement on Morse's in being worked by a less amount of battery current over the main line, or by a gain of power with the same amount of battery, and also being less liable to derangement from atmospheric electricity.

Interrogatory 8th. Is or not the fact that the Columbian Telegraph is less liable to disturbance from atmospheric electricity owing to its being moved by a permanent magnet?

Answer. It is.

Cross interrogatories by Charles S. Davies and F. O. J. Smith, esqrs., for plaintiffs.

1st. What is the nature of the power in its difference from purely an electro-magnetism employed to produce a change of polarity between one and more permanent magnets in the Columbian Telegraph? How is it generated, how conducted, and how applied to produce a movement?

Answer. In electro-magnetism you have but the attractive power of magnetism, but in the arrangement of the permanent magnets of the Columbian Telegraph we have both the attractive and repellant force

acting at the same time. It is generated by changing the current of electricity passing around an electro-armature plying between the faces of the permanent magnets.

It is conducted by two circuits of wires from two local or resident batteries, and applied by means of a mutator or poll changer, and finger key, placed in the circuit of the main battery.

2d cross interrogatory. In what does the repellant force of a permanent magnet, when produced by a current of electricity passing around an electro-armature, differ from what you have called pure electro-magnetism?

Answer. In the permanent magnet there is a change of polarity at every complete vibration of the armature or operative bar; but in the electro-magnet there is no change of polarity.

3d cross interrogatory. What difference in principle, if any, do you know to have existed between what you have described as the first and third magnets used by Prof. Morse, and also between each; and the one you have described as invented by Dr. Paige?

Answer. The principle is the same in Professor Morse's and Dr. Paige's; Dr. Paige's being only an improvement over Prof. Morse's first magnet, and Professor Morse's second being a further improvement of Dr. Paige's.

4th cross interrogatory. In what do these respective improvements consist?

Answer. They consist in both cases in the use of smaller wire for the construction of the magnets, by which the same amount of power can be had by a smaller amount of battery current, and also by being more convenient for use by the great decrease in size and weight.

5th cross interrogatory. How is pure electro-magnetism generated, conducted, and applied, in telegraphing?

Answer. It is generated by passing a current of electricity around a bar of soft iron; is not conducted as applied as an attractive power to operate upon an armature of iron attached to the operative bar.

6th cross interrogatory. What is the office of the mutator that you speak of?

Answer. The mutator is used for the purpose of changing the polarity of the electro-armature in the register.

7th cross interrogatory. By what process is the change effected?

Answer. By the action of a current of electricity from the main battery, acting upon the operative bar of the mutator, thereby changing its polarity; and by repulsion closing one of the resident or local circuits, and by the attractive power of the permanent magnet, closing the other resident circuit by the breaking of the main circuit.

8th cross interrogatory. Were two electro-magnets so placed as to face the positive pole of one directly towards and near the negative pole of the other when the circuits of electricity were passing around them, would they or not attract each other; and if afterwards, by means of a mutator or any other means, the two currents of electricity were changed so as to bring the negative poles of the two magnets to face each other,

and their positive poles in like manner to face each other, instead as in the first case, would they not repel each other?

Answer. To the first part of the question, they would: to the second branch of the question, they would.

9th cross interrogatory. What do you mean to say was the invention claimed by Prof. Morse, in the form of the magnet? Did he claim to have made a new invention of form; or only to have made a new application of its power? If of the form, please describe that form.

Answer. I do not know that he ever claimed the invention of the electro-magnet; I suppose only the application of its power to telegraphing.

10th cross interrogatory. After quitting the station in New York, as you mention, in March, A. D. 1847, where did you then go, and in whose service did you then engage, and how and where have you been employed since?

Answer. I went to Harrisburg, Pennsylvania, and engaged in the service of Henry O'Rielly and others, on the Philadelphia and Pittsburg line. Since then I have been engaged on the Atlantic, Lake, and Mississippi telegraph range.

11th cross interrogatory. How many of the three hundred pound magnets have you known to have been used; and at what station, and at what time, were they respectively discarded? Please state such dates with as much precision as you are able.

Answer. There were two only of the large magnets used, that I have any knowledge of; one was used at Washington, and the other at Baltimore; one was afterwards carried to New York, but not used there. I think they were discarded in the fall of 1845.

12th cross interrogatory. Is not the electro-armature described by you as used in the Columbian telegraph, between the permanent magnets, an electro-magnet of precisely the same nature, made and unmade by the same act of forming or breaking a current of electricity, or galvanism passing around it, as is used, and is indispensable, in Morse's telegraph?

Answer. The electro-armature of the Columbian telegraph, is an electro-magnet, made and unmade as other electro-magnets are, but applied for a very different purpose from the electro-magnet in Morse's telegraph.

13th cross interrogatory. Is or not the electro-magnet used in the Columbian telegraph, as described in your last answer, applied to regulate the formation of dots and marks, constitute an alphabet for communicating intelligence at a distance?

Answer. It is.

14th cross interrogatory. Is not that the purpose for which it is used in Morse's telegraph?

Answer. It is, by a different application.

15th cross interrogatory. What do you mean by a different application?

Answer. The mode of application of electro-magnetism in the two

instruments is essentially distinct. In that of Morse, the electro-magnet and its armature are used with the direct current to procure force; and upon the circuit being broken, the pen is connected by a fixed spring, which always resists the magnetic power; while in the Columbian instrument the electro-magnet acts alternately as an armature to the fixed magnets, which alternately attract and repel it, as its poles are changed by a change of direction in the electric current.

14th cross interrogatory. In framing your last answer, to what have you referred, and from whose opinion have you drawn it; how far have you undertaken to vary it?

Answer. I have referred to the opinion of Professor R. T. P. Allen, and I adopt his language as expressive of my knowledge and opinion on the subject.

CHARLES T. SMITH.

UNITED STATES OF AMERICA,
Maine district, ss.

I, George F. Shipley, a commissioner, appointed by the circuit court of the United States, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes, depending in the courts of the United States," passed February 20, 1812; and the act of Congress, entitled "an act in addition to an act entitled an act for the more convenient taking of affidavits and bail in civil causes, depending in the courts of the United States," passed March 1, 1817; and an act entitled "An act to establish the judicial courts of the United States," passed September 24, 1789, do hereby certify, that the foregoing deposition was taken by request of the defendants; and the reason for taking the same is, that the testimony of said witness is alleged to be material and necessary in the cause in which the same is taken, to wit, wherein Samuel F. B. Morse, Alfred Vail, and others, are plaintiffs in equity, and Henry D. O'Rielly and others are defendants, now pending in the circuit court of the United States for the eighth circuit, next to be holden within and for the district of Kentucky, on the third Monday of October, A. D. 1849; and that said witness lives at a greater distance from the place of trial than one hundred miles.

I further certify that I am not of counsel or attorney to either of the parties, or interested in the event of the cause; and that a notification, signed by me, before whom the said deposition was taken, to the adverse party to be present at the taking of the same, and to put interrogatories, if he thought fit, was first made out and served on Francis O. J. Smith, esq., one of the said plaintiffs, being the nearest, and within one hundred miles of the place of caption, allowing time for his attendance, after [being] notified, not less than at the rate of one day, Sundays exclusive, for every twenty miles travel; and said Smith was present at the taking of the same.

I further certify that I caused to be, and personally appear before me, at my office, in Portland, Charles T. Smith, the said witness, on

the 28th day of August, A. D. 1849, who was of lawful age, and said witness was by me first carefully examined, and cautioned, and sworn to testify the whole truth; and said deposition was reduced to writing by me in the presence of the said witness, and was afterwards by him subscribed in my presence.

And said deposition, so taken, has been retained by me until I now seal the same, and direct it with this certificate of the reason of its being taken, and of the notice given to the adverse party by me as aforesaid.

In testimony whereof I have hereunto set my hand and seal, this first day of September, in the year of our Lord one thousand eight hundred and forty-nine. [L. S.]

G. F. SHEPLEY,
Com issioner of the circuit court of U. S., Maine district.

Deposition of B. Silliman.

Benjamin Silliman, being produced and sworn as a witness in said causes, deposes as follows:

Question 1st. Please state your residence and occupation; also what opportunities you have possessed of knowing the processes of discovery in science, and for what length of time.

Answer. My residence is at New Haven, Connecticut; I am professor of chemistry and pharmacy, and mineralogy and geology in Yale college, and have been a public teacher in these departments of science during forty-five years. I have also edited the American Journal of Science and Arts since 1818, with co-editors since 1838 and 1846; and in that journal most of the important discoveries in physical science have been recorded. I have also sustained personal communication with men of science at home and abroad.

Question 2. Please look at the paper now shown you, and identify it by your initials. Please state whether or not you received the letter of which it purports to be a copy or original draft. If you did, please furnish a copy.

Answer. I distinctly recollect the letter of which the paper shown me is a copy or rough draft; a great part of it was published in the American Journal of Science and Arts, vol. 24, p. 146, which is of course decisive proof that I received it. The suggestion respecting telegraphic communication was of course omitted, as the plan was not matured. I cannot annex the letter which I received, or a copy of it, as after search in my files I have not succeeded in finding it. Many of my letters have been destroyed, and others deranged in place, which accounts for my not being able to find it without a more extended search than I have now time to make.

Qnestion [3.] Please state by whom, to the best of your knowledge, the practicability of producing mechanical effects at a distance by means of electro-magnetism was first discovered and tested by experiment. Refer to the papers, if any, in which that discovery, and the experiments bearing on it, were published. Refer to any experiments

within your knowledge disproving, or supposed to disprove, the practicability of obtaining such results.

Answer. To the best of my remembrance and belief the first decisive and satisfactory demonstration of the practicability of producing mechanical effect at a great distance, was made by Professor Joseph Henry, in a series of experiments, an account of which was given in his communication published in the appendix to vol. 19, of the American Journal of Science and Arts. This communication was of great importance, and the distinguished author has since prosecuted his researches with an ability and success which entitles his opinions on these subjects to the highest consideration, with which they are justly regarded both in this country and in Europe.

Professor Henry was also the first, to the best of my knowledge and belief, to test, by experiment, the practicability of producing such effects, by contriving a device or instrument for producing a reciprocating motion in a beam, as described and figured in the American Journal of Science and Arts, vol. 20, p. 340.

I am not aware of any experiments supposed to disprove the practicability of obtaining mechanical results at *at* a distance by electro-magnetism, except those described in Professor Barlow's paper, in the Edingburgh Philos. Jour., vol. 12, p. 105, proving the diminution of energy in the action of the electro-motive power propagated through a long coil.

B. SILLIMAN.

Circuit court of the United States, for the district of Kentucky.

SAMUEL F. B. MORSE, Francis O. J. Smith, and Alfred Vail,
vs.
HENRY O'RIELLY, Eugene L. Whitman, et al.

I, Henry Dutton, judge of the county court in and for the county of New Haven, in the State of Connecticut, do hereby certify, that *that* the above named Benjamin Silliman, who lives in the city of New Haven, in the county and State aforesaid, a place more than one hundred miles from the place of trial of said cause, was this day produced before me, and examined as a witness in behalf of the defendants therein, and was sworn to testify the whole truth. I further testify that his deposition was reduced to writing by myself, and was subscribed by [him] after having been so reduced to writing. And further, that I am not counsel or attorney for either of the parties, or interested in the event of this cause.

In witness whereof I have hereunto subscribed my name and style of office, this 17th day of September, 1849.

HENRY DUTTON,
Judge of the county court in and for New Haven county, State of Connecticut.

Deposition of P. D. Myers.

UNITED STATES,
Eastern district of Pennsylvania, ss.

Be it remembered that, on the twenty-fourth day of September, A. D. 1849, I, Jabez Burchard, a commissioner duly appointed by the circuit court of the United States, for the eastern district of Pennsylvania, did call and cause to be and appear before me, at my office, in the city of Philadelphia, P. D. Myers, J. Francis Fisher, and John C. Cresson, all of the said city of Philadelphia, to testify [and] the truth to say on the part and behalf of the defendants in a certain suit or matter of controversy, now depending and undetermined in the circuit court of the United States, for the district of Kentucky, sitting at Frankfort, wherein Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith are plaintiffs, and Henry O'Rielly and Eugene L. Whitman et al., are defendants; and the said P. D. Myers being first introduced, and being above the age of years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said P. D. Myers, and he did thereupon depose, testify, and answer, to the following interrogatories, make, as follows, viz:

Interrogatory. Please look at the book now shown you and identify the same by your initials; state what you know as to the time of publication and object of it; state, also, whether you are acquainted with the author, and where he now is.

Answer. The book was shown me, and identified by my initials and the signature of the commissioner, was published by James Swaim, the author, then a young man in Philadelphia, in 1829. Dr. Swaim never took out a copy right for it; he is now absent, and has been several months in Europe, and is not expected to return this fall; he was at the time of the publication a young man of great fertility of invention, and devised this scheme of telegraphing for the use and amusement of himself and friends.

The alphabet of dots and lines and dictionary was often the subject of conversation, and often in use for purposes of communication. The lines, as is obvious, may be made horizontal as well as vertical, altho' represented as vertical in the book, by which a saving of space in the representation of them is effected. I speak with certainty in regard to the above, Dr. James Swaim being my nephew, and having been in daily intercourse with him for some years past.

P. D. MYERS.

Taken, sworn, and subscribed, the 24th day of September, 1849, before me—

J. BURCHARD,
U. S. commissioner.

Deposition of J. F. Fisher.

Deposition of J. Francis Fisher, to wit:

J. Francis Fisher, being about the age of years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said J. Francis Fisher, and he did thereupon depose, testify, and answer make, to each of the following interrogatories, as follows, viz:

Interrogatory 1. Please state whether you have been examined in any case in which Morse and others are complainants, and O'Rielly and others are defendants. If so, when and at whose instance?

Answer. I have testified in a case in which I believe S. F. B. Morse and others are complainants, and O'Rielly and others are defendants, at the instance of Mr. Morse.

Interrogatory 2. Please state whether you are acquainted with Samuel F. B. Morse. If so, where did you become acquainted with him? What was his occupation at that time? Did you or not return with him from Europe in 1832?

Answer. I became acquainted with Mr. Morse in Rome, in the beginning of the year 1831, while he was pursuing his studies as a painter in that city. I met him subsequently at Paris in the following winter several times, and came home with him in the "Sully," in October, 1832.

Interrogatory 3. Was Dr. Charles T. Jackson, of Boston, a passenger in the same vessel? If so, what acquaintance did he appear to have with electricity, magnetics, and electro-magnetism, and how did he manifest that acquaintance, if any?

Answer. Dr. Charles T. Jackson was a passenger in the same ship, and from his conversation I judged that he had paid much attention to physical science. The first conversation I recollect in which he exhibited his acquaintance with those sciences was that in which all parties agree that the idea of an electro-telegraph was first thrown out. I afterwards heard him repeatedly talking on such subjects with Mr. Morse.

Interrogatory 4. What do you recollect of the first suggestion of the idea of communicating information by signals at a distance; by whom was it made, and who were present.

Answer. The first persons, as well as I can recollect, *was* Mr. Rives, Dr. Jackson, Mr. Morse, and myself; there may have been others; this was at the table after one of the meals, when Dr. Jackson was describing the shock conveyed through wires, of many miles in length, around the college of Sorbonne, at Paris. Some one, I can't recollect who, "why can't it be used for telegraphic purposes, or communicating intelligence at a distance?" I can't recollect what answer Dr. Jackson made; it is very possible he may have expressed his opinion that it could be done. I don't recollect any thing further that

transpired during this conversation; this was the first of a series of conversations which I took part in or listened to during the voyage.

Interrogatory 5. Did or did not Mr. Morse, in any of the conversations on the subject of the telegraph with you, or in your presence, refer to any knowledge prior to going to Europe?

Answer. I have no recollection of Mr. Morse referring to any previous acquaintance with electro-magnetism.

Interrogatory 6. Do you remember any thing of any experiment or trial of a proposed system of telegraphic signs with the aid of a dictionary by Dr. Jackson and Mr. Morse? If so, state what you remember.

Answer. I recollect Mr. Morse arranging a series of signs, and having arranged them, trying them with Dr. Jackson; this arrangement was either wholly or chiefly Mr. Morse's. My impression is, that Mr. Morse consulted Dr. Jackson on the subject, but to what extent I am not able to say.

Interrogatory 7. How far did Dr. Jackson, according to your recollection, participate in the attempts to devise a plan of telegraphic communication made by Mr. Morse?

Answer. I may say that Dr. Jackson was consulted by Mr. Morse more than any other passenger, as he seemed to be possessed of more scientific knowledge than any other.

Interrogatory 8. State whether or not Dr. Jackson may have stated in answer to the inquiry "why electricity could not be used for communicating intelligence," that it could be done, and suggested a mode of doing it.

Answer. He might have made the statement and suggestion, although I do not recollect it. I might, perhaps, have recollected it, if my attention had been called to it soon after the transaction, but I had no occasion to think of it until Mr. Morse wrote me on the subject in the fall of 1837, and when I referred him to Dr. Jackson as the person most likely to recollect the details.

Interrogatory 9. State what information Dr. Jackson gave Mr. Morse as to a plan of machinery for communicating telegraphic intelligence.

Answer. I don't pretend to know what information he did communicate. I have already stated that he was frequently consulted, but what transpired in their conversations I cannot remember.

J. FRANCIS FISHER.

Taken, sworn, and subscribed this 24th day of September, 1849, before me,

J. BURCHARD, *U. S. Comm'r.*

Deposition of J. C. Cresson.

John C. Cresson having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said John C. Cres-

son, and he did thereupon depose, testify, and answers make, to each of the following interrogatories, as follows, viz:

Interrogatory 1. Please state whether or not you are acquainted with the principles and mode of operation of Morse's electro-magnetic telegraph; if aye, how long have you been acquainted with it?

Answer. I am acquainted with the principles and mode of operation of Morse's Electro-magnetic Telegraph, and have been so acquainted with it from the period of its introduction to public notice, having become acquainted with it when acting in the capacity of a member of a committee of the Franklin Institute of the State of Pennsylvania, to which Mr. Morse submitted it before it was put in public use. I have been acquainted with its principles and mode of operation ever since.

Interrogatory 2. Please look at the drawings now shown you, marked "G. W. B," and "N. B. C," and identified by G. S. Hillard, commissioner, representing an instrument called the Columbian Telegraph, and give a brief description of its principles and mode of operation.

Answer. The telegraphic apparatus exhibited in the drawings referred to consists of two instruments; one called, as I am informed, the "mutator," with its battery and main circuit of wire; the other called the "register," with two batteries and two local circuits of wire. The mutator consists of a horizontal permanent magnet, with a rectangular soft iron armature, the two arms of which are so disposed as to move freely within two cylindrical coils of wire placed opposite to the permanent magnet. The armature is suspended by a bar attached to its transverse bar, which suspending bar moves upon an axis between two points of screws opposite to each other. Attached to the transverse bar of the armature of the permanent magnet is a spring on the side opposite to that on which the permanent magnet is placed, and in the same plane.

In this instrument the power of electro-magnetism is used to neutralize the attractive force of the permanent magnet of its soft iron armature; when the main current is closed, the galvanic current passes through the coils and magnetizes the armature of the permanent magnet with similar polarities, by which the influence of the permanent magnet upon its armature is so far neutralized, that the fixed spring attached to its transverse bar withdraws the armature and brings the suspending bar into contact with the point of one of the screws, which contact completes one local circuit of the register; when the main circuit is opened and the current intercepted, the temporary magnetism induced in the armature almost wholly disappears. Its arms are then forcibly attracted by the permanent magnet, and the suspending bar is brought into contact with the point of the other screw, and thus the second local circuit of the register is completed.

The register consists of two permanent magnets placed opposite to, but near, each other horizontally, and in the same plane, so that the north and south poles of the one are opposite to the south and north poles of the other respectively; between these two magnets is placed a soft iron bar, surrounded by a coil of wire, so arranged as to move

freely between the opposite magnets. When the first local circuit is completed, a galvanic current is transmitted through the coil of wire, instantaneously magnetizing the soft iron bar with polarities opposite to those of one of the two permanent magnets, and similar to those of the other. The soft iron bar is then attracted by the one magnet and repelled by the other, carrying with it the pen bearer or marker connected with it. When the first local circuit is opened, and the second closed, the galvanic current is sent round the coil in the contrary direction, magnetizing the iron bar with reversed polarities, so that the magnet which before attracted now repels, and that attracts which before repelled; and the coil, with its bar and pen bearer or marker, receives a motion contrary to that communicated by closing the first circuit.

Please state whether or not, in your judgment, the Columbian Telegraph, as just described, is substantially identical in principle and mode of operation with the Morse Telegraph; if not, wherein do they differ?

In the Morse Telegraph, electro-magnetism is applied directly to move a soft iron armature of the electro-magnet, to which an apparatus is attached, which either closes a second or local circuit, or operates the marker, as circumstances require. In the Columbian Telegraph as in the Morse Telegraph, electro-magnetism is indispensable. The instrument could not be worked without it; but the arrangement of the machinery is different, and the power is differently applied. In the Columbian, electro-magnetism is not used directly as the working force of the instrument, but indirectly to neutralize the action of the permanent magnet, by which means its armature is subjected to the action of the spring, the force of which, when the temporary magnetism is annulled by opening the circuit, is again overcome by the attraction of the permanent magnet. In the register, electro-magnetism is used to change the polarities of the soft iron bar, so that it will be alternately attracted and repelled by the permanent magnets on each side of it. This application of electro-magnetism is quite distinct from that made of the same power by Mr. Morse; and if, by the arrangement adopted in the Columbian, important advantages in the working of the instrument are secured, such as comparative exemption from the disturbing effects of atmospheric electricity, I should consider the Columbian Telegraph a distinct instrument from that of Mr. Morse.

Please refer to the volume and page in which may be found the report of the committee to which you have already referred, if one was made; state also what was said by Mr. Morse or his associate, Mr. Vail, in reference to a second or local circuit, at that or at any other time to you, or in your presence.

A report was made by the committee, in which I concurred, and was published in the Journal of the Franklin Institute, in the No. of February, 1838, on page 106 of the 21st volume, 2d series. So far as I can recollect, no allusion was then made by Mr. Morse or Mr. Vail to the use of a secondary or local circuit; nor did I, at any time, hear them speak of such a circuit, in combination with the telegraph,

until Mr. Vail referred to it in a conversation at Baltimore some years afterwards, when Mr. Vail showed me its operation as an improvement. When I first witnessed the operation of the telegraph in Baltimore, my belief is, there was no secondary or local circuit.

Please state your age, occupation, and residence.

I am forty-three years of age; I reside in Philadelphia, and am superintendent of "the Philadelphia Gas Works," and president of the "Mine Hill and Schuylkill Haven Railroad Company."

I held for ten years the professorship of mechanic and natural philosophy in the Franklin Institute of Pennsylvania, and have made the subjects of electricity, magnetism, and electro-magnetism, the objects of my research and investigation for many years.

JOHN C. CRESSON.

Taken, affirmed, and subscribed, this 24th day of September, 1849, before me,

J. BURCHARD,
U. S. commissioner.

UNITED STATES,
Eastern district of Pennsylvania, ss.

I, Jabez Burchard, a commissioner duly appointed by the circuit court of the United States for the eastern district of Pennsylvania, in the third circuit, under and by virtue of the acts of Congress, entitled "Acts for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," do hereby certify, that the reason for taking the foregoing depositions is, and the fact is, the witnesses are material and necessary in the cause in the caption of the said deposition named, and that they are residents of the city of Philadelphia and State of Pennsylvania, being distant more than one hundred miles from the place of trial of the said cause. I further certify, that no notification of the time and place of taking the said depositions, signed by me, was served on the adverse party, or their attorney, to be present at the time of taking the depositions, and to put interrogatories if they might think fit, because the said adverse party and their attorney reside at a greater distance than one hundred miles from the place of the trial of the said cause in the caption of the said depositions named.

I further certify, that, on the 24th day of September, in the year of our Lord one thousand eight hundred and forty-nine, I was attended by counsel for the defendants, and by the witnesses, who being of sound mind and lawful age, and the witnesses being by me first carefully examined, and cautioned, and sworn, to testify the truth, the whole truth, and nothing but the truth, and the depositions being by me reduced to writing in the presence of the witnesses, and from their statements, and after carefully reading the same to the witnesses, they subscribed the same in my presence.

And I do further certify, that I am not of counsel nor attorney for

either of the parties in the said deposition and caption named, nor in any way interested in the event of the cause named in the said caption.

In testimony whereof I have hereunto set my hand and seal, this twenty-fourth day of September, A. D. 1849, and of the independence of the said United States the seventy-fourth.

J. BURCHARD, [L. S.]
U. S. commis'r for E. district of Pennsylvania.

UNITED STATES OF AMERICA,
Eastern district of Pennsylvania, ss:

I certify that Jabez Burchard, esq., before whom the foregoing depositions were taken, and who has subscribed the accompanying certificate thereof, was, at the time of taking said depositions, and subscribing such certificate, a commissioner of the circuit court of the United States for the eastern district of Pennsylvania, to take affidavits and bail in civil cases, duly appointed and qualified.

In testimony whereof I have hereunto subscribed my name, and affixed the seal of said court, at Philadelphia, this twenty-
[L. S.] ninth day of September, A. D. 1849, and in the seventy-fourth year of the independence of the said United States.

GEORGE PLITT, *Clerk C. C.*

Deposition of C. T. Jackson.—Deposition of Charles T. Jackson.

1. Please state your age, occupation, and residence, and what opportunities, if any, you have enjoyed of becoming acquainted with chemistry and electro-magnetism. Please state fully your course of study and examination of these subjects prior to the fall of 1832.

Answer. I am forty-four years old; I was educated a physician, and am engaged in scientific pursuits, chemistry, mineralogy, and geology. I reside in Boston. I have been employed as State geologist by the State of Maine, by the State of Massachusetts for the public land in Maine, as State geologist by the States of New Hampshire and Rhode Island, and am now United States geologist for the mineral lands of the United States in Michigan. I was early interested, while a boy, in the study of electricity. Between my thirteenth and sixteenth years I had constructed electrical machines, and had performed most of the experiments described by Dr. Franklin. I engaged in the study of chemistry at the same time, and have pursued it with ardor ever since. Between 1823 and 1825 I became practically acquainted with the subject of electro-magnetism, having read and repeated the experiments of Oersted and Sœmmering on electro-magnetic coils. With the assistance of Elisha Deville, a mathematical instrument maker of Boston, I constructed a number of pieces of apparatus, and repeated the experiments described. I continued the study of chemistry and electro-magnetism, as I could find time, till I went to Europe. After I had received my degree of doctor of medicine, in 1829, I went to Europe for the purpose of improving myself in medicine, and in the collateral branches of science. While there I attended the lectures in the school of medicine

in the college of France, one of the courses in the Ecole Royale des Mines, and in the academy of the Sorbonne, all in Paris. I became deeply interested in Pouillet's lectures on electro-magnetism at the Sorbonne. I was in the habit of frequenting the shops of instrument makers, especially that of Pixii, where electro-magnetic instruments are manufactured, and of examining every new instrument produced. I purchased of Pixii an excellent electro-magnet, and two small galvanic batteries used in putting it in action, and brought them home with me in the packet ship Sully, which left Havre for New York, October 6th, 1832.

2. Please state whether or not you are acquainted with Samuel F. B. Morse; if yea, when and where did you become acquainted with him; what communication or conversation, if any, did you have with him, or others in his presence, on the subject of electro-magnetism, and its application in the transmission of intelligence?

Answer. I am acquainted with Samuel F. B. Morse. The first time I ever saw him was on my voyage home in the Sully, as above mentioned, he being one of my fellow-passengers; while on the voyage one day, at table, I introduced the subject of electricity and electro-magnetism, describing an experiment by Pouillet, of sending electricity a great many times around the academy of the Sorbonne without any perceptible loss of time. There being some expression of incredulity, I endeavored to enforce the fact by alluding to Franklin's experiment of transmitting an electric spark to a great distance, using a wire and water as conductors. Mr. Morse asked in which of Franklin's works it was contained; and said he had never read it. I stated I believed it was in his autobiography. After some discussion on the point, one of the passengers said, "it would be well if we could send news in this rapid manner." This was a casual remark, in allusion to our earnest desire to hear from home, as there was some apprehension of a war with France. Mr. Morse said, "why can't we?" I immediately replied, "we can; there is no difficulty about it," and then proceeded to describe various methods, by which I conceived that intelligence might be transmitted by electricity and electro-magnetism.

First, I proposed to count the sparks in a disjoined wire circuit, counting the sparks in time; that is, counting or noting the sparks, and the intervals between the sparks. Second, by producing colored marks upon prepared paper, the paper being saturated with an easily decomposable neutral salt, and stained with turmeric, or some other easily changed vegetable colors. Third, by saturating the paper with a solution of acetate of lead, or carbonate of lead, the paper being moistened, while the electric current was passed through it, or over its surface, between points of platinum wire. Fourth, I proposed to make use of the electro-magnet, which is formed by coiling wire, insulated by being wound with silk, around soft iron bent in the form of the letter U, the iron being rendered temporarily magnetic by the passage of a galvanic current through the copper wire, a keeper or armature of soft iron being placed across the poles, and attracted firmly against them

during the time the galvanic current is passing. I proposed to connect with this keeper the short arm of a lever beam, and to fix a point of steel in the long arm of the lever, so that when the keeper was drawn to the electro-magnet, the point should perforate holes in paper. The paper was to be passed from one reel to another by clock-work machinery, so that in intervals of space these holes might be punctured, and telegraphic indications be produced thereby.

When I mentioned the word electro-magnetism in the presence of Mr. Morse during this conversation, he asked me the meaning of the term, saying, "electro-magnetism! how does that differ from any other magnetism?" I explained it to him, making drawings of electro-magnets and a galvanic battery for that purpose. He did not appear to be acquainted with the subject.

During a part of this conversation Mr. Rives and Mr. Fisher were present, and two Messrs. Palmer, of New York, and Capt. William Pell. They were present at the beginning of the conversation, and heard a considerable portion of it, and they all seemed to consider my project visionary. Mr. Morse at that time made inquiry, and suggested difficulties, and seemed to regard the thing as impracticable. My earnestness increased in proportion to their apparent incredulity.

The next morning Mr. Morse came to the breakfast table, and said he had not slept during the night, and had been thinking about what I had told him about telegraphing, and he was satisfied it could be done. I said, "to be sure it can; there is no difficulty about it." We discussed the subject for some time, and during this conversation I spoke of having an electro-magnet on board, and two galvanic batteries, which were stowed away between decks. I made drawings, rough sketches, as I do not profess to be a draughtsman, of the electro-magnet, which I gave to Mr. Morse, who copied them into his note book in an artistic manner, asking of me explanations as he made the drawings. Either on this or a subsequent day, I also described to Mr. Morse a method of making signals, or light-houses, by the sudden ignition of charcoal points, after the method discovered by Dr. Hare. I made drawings, and showed them to Mr. Morse, but upon this method we had very little conversation afterwards.

During the rest of the voyage, Mr. Morse appeared very much occupied with the idea of a magnetic telegraph, and followed me about the vessel, asking me questions, and taking notes in his memorandum book. I grew tired of his questions, as they were purely elementary, and had reference to the detail of an instrument and process which I thought I had already sufficiently and clearly explained, and I may have occasionally manifested some indifference when interrogated by him. On one or two occasions I manifested some impatience when interrupted by Mr. Morse with questions, while I was engaged in researches in regard to the circulatory organs of porpoises and fishes. These were the only times in which I was engaged in any researches in natural history while on board the vessel, and to these I was led partly by the request of the captain, who wished to understand the

structure of the heart, and to see the valves. I told him if he would catch a porpoise I would show him, as the heart of a porpoise resembles closely the human heart.

Within a few days after my first conversation above mentioned, I think the third day after, I had a conversation with Mr. Morse as to the practicability of devising a system of signs which could be readily interpreted. I proposed an arrangement of punctured points or dots, to represent the ten numerals. Mr. Morse proposed to reduce it to five numerals and a zero, saying that all numbers could be represented thereby. Mr. Morse took a dictionary, and numbered the words, and then tried our system of dots against it. We assigned to each word selected for that purpose a separate number, and the numbers were indicated by dots and spaces. We took our respective places at the opposite sides of a table. He would send me despatches written in numerals, which I would examine by the aid of the marked dictionary which I held in my hand, and I found no great difficulty in reading them; and then we would change, he taking the dictionary, and I sending the words. Mr. Morse took the principal part in arranging the system of signs, and deserves the greatest credit for it. Mr. Morse made notes of the system of signs, so far as we had completed it, in his note book either fully or partially. We had absolutely concluded on no complete system before the termination of the voyage.

I saw Mr. Morse's note book in which he made his plans and observations from his first entries in it, in regard to the telegraph, until the end of the voyage. He would often bring it and show it to me, and show me the notes and plans in it, but I never had it in my possession. I saw nothing in it which I had not explained and given him rough drafts of, except the system of signs, which was the result of our joint action, as before stated. We gave the name of Electro-magnetic Telegraph to the instrument proposed and explained as above, and this was the name by which it was known and called in our conversations.

After our arrival in New York, Mr. Morse brought to me in New York a plate of copper and a plate of zinc, each about two inches square, connected by a strip of copper more than a foot in length and about half an inch in width, and asked me if that would do for an elementary battery. I told him no, that it would make no battery at all; that the plates must be near each other, and not connected, for an elementary battery which he proposed to make. His producing a contrivance like that showed that he was not acquainted with the subject of galvanism; not even knowing how to construct a galvanic battery, which is essential to produce the electric current. I explained to him how it should be made.

In a few days after my arrival at New York, I returned to Boston. Afterwards I went to Philadelphia to attend the medical lectures; and, in the spring of 1833, I commenced the practice of my profession in Boston. Soon after my circumstances became embarrassed, through the loss of my property from the failure of my agent, and I was obliged to devote myself assiduously, and almost exclusively, to the support of

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myself and my family, having been married in February, 1834; so that I gave little attention, comparatively, to the magnetic telegraph.

In the spring of 1833, soon after my return from Philadelphia, an article was shewn to me in the New York Railroad Journal, wherein an account was given of a caveat filed at our Patent office for a magnetic telegraph by an Englishman. This instrument resembling, in some of its details, that which I had described to Mr. Morse, I wrote to him requesting to ascertain who this Englishman was, and if he had got possession of our plan. I think Mr. Morse replied to this letter, but I cannot say positively, as many of my letters were destroyed by a fire in my house, in 1845.

Subsequently, Mr. Morse visited me in Boston, and told me he found this Englishman boarded at Brinker's hotel, where Capt. Pell also boarded, and that he had probably heard Capt. Pell talk about it at table. Up to this time Mr. Morse had not set up any exclusive claim to the telegraph; but, in his conversations with me, he had always spoken as if he regarded me as the originator of the idea of transmitting intelligence by electro-magnetism, and the contrivance for that purpose, devised on board the Sully, as the fruit of our joint consultations. He claimed no share in anything which was not mechanical.

During this visit Mr. Morse requested me to put up an experimental telegraph between Boston and Cambridge for the purpose of testing its practicability. I declined on account of the embarrassed state of my affairs, the expense being more than I could afford, and my time being very much occupied with medical business. I told him that the batteries required for the purpose would be very expensive; that several would be required in order to maintain a steady current, no constant battery having been invented at that time. Mr. Morse wished to know who had powerful galvanic batteries, and I referred him to Dr. Hare and Professor Silliman. We had a great deal of conversation about our invention of the telegraph, and I think I showed him the electro-magnet of Pixii, of which I had given him a description and a rough draft on board the Sully.

He subsequently visited me, I think in 1836, or perhaps in 1837, some time before he went to Europe, and we had much conversation upon the mode of conveying information by means of an electric telegraph. The most friendly relations subsisted between Mr. Morse and myself at this time, and continued till he attempted to appropriate to himself the exclusive merit of having invented the telegraph, with the view of obtaining a patent. In all our investigations, I had not regarded it in the light of a commercial enterprise, but as a matter of scientific interest. My object was, and I supposed Mr. Morse's was up to the time I learned he was applying for a patent, to establish a new application of science to the arts, of which I desired the community at large should have the benefit. I always expressed, among my acquaintances, my views freely upon the impropriety of scientific men taking out patents for their discoveries, but do not remember any particular conversation with Mr. Morse upon this subject, though I think

he could hardly have been unacquainted with my sentiments upon this subject.

3. Please state whether or not, after your return from Europe, you constructed any telegraphic apparatus; and if any, what.

Answer. In 1834 I took the electro-magnet which I brought home in the Sully, which I have now before me, and fixed it firmly inside of a wooden box having a hole sawed in the side for the passage of a lever beam, the short arm of which was to be attached to the armature of the magnet, the fulcrum being an iron wire passing through the side of the box and the lever; a pin was inserted in the long arm of the lever for the purpose of puncturing holes in paper; a weight was placed under the armature for the purpose of drawing the armature away from the magnet when it ceased to be magnetized. The wires from the electro-magnet came through holes in the side of the box, and were connected with long wires which traversed the apartment, and communicated with a small galvanic battery at the other end of the apartment. This was a rough and extempore contrivance for the purpose of testing the practicability of working a lever beam by electro-magnetism, so as to produce by the pen point, attached to the end of it, punctures on paper or other permanent markings or impressions. I proposed at this time not only to effect punctures for the purposes of telegraphic communication, but also to attach actual type to the lever or double boxes, made so as to contain a sponge dipped in ink which would produce numbers or letters through a *stiral* plate, which formed the bottom of the box. In this case I proposed to use a number of electro-magnets, corresponding to the numbers or letters employed. But this plan of printing I never reduced to practice. I had not thought at this time of any other signs than those which are above referred to, namely, chemical marking and punctures, or impressions on paper, as above described; but the contrivance as above detailed, which would give these signals, would, it is obvious, produce any desired signs, or any system which might be devised or used by an operator.

4. Please state whether or not, after your return from Europe, you had any communications or conversations in regard to the electro-magnetic telegraph with others besides Mr. Morse; if so, with whom, and what was it.

Answer. Immediately upon my arrival at New York I spoke freely on the subject, especially at Brinker's Hotel, where I was staying, with such of the boarders as I knew; among others, with Horatio Bigelow, esq., now of Boston. I wrote a letter to Prof. Silliman, dated New York, December 25, 1832, announcing my return home, and giving a brief account of my observations abroad. I gave him an account of the most recent electro-magnetic machine which had been invented in Paris, namely, Piscii's magneto-electric machine, by which sparks were drawn from a magnet. I also described the experiments which I performed with this at Piscii's. The extract from this letter was published in the American Journal of January, 1833, I believe. I also referred to the invention of the electro-magnetic telegraph as follows:

"On my voyage home I had the pleasure of becoming acquainted with Mr. S. F. B. Morse, a distinguished American artist, who is very ingenious in mechanical inventions. We employed our weary hours at sea in contriving various things, among which we invented an electric telegraph, light-house, &c.; as we intend to make some experiments before we say any thing about these products of our speculations, I forbear troubling you with a description of the machinery until it shall be matured, and proved on a small scale by actual trial."

I have the letter from which the extract is made before me, which is identified by my initials, and those of the magistrate, and it is the rough draft of the letter which I sent at that time to Prof. Silliman. It is injured by the fire already referred to. After my return to Boston, I had repeated conversations with Cyrus Alger, esq., of South Boston, and his son Francis Alger, esq., on the mode of telegraphing by electro-magnetism, and the contrivances for that purpose, as herein before described. I showed Francis Alger in 1834 the electro-magnet, with the lever beam attached, as heretofore described, and put it in action in his presence; at the same time I described to him Piscii's magneto-electric machine for drawing sparks from a magnet, but I had not this last machine before me. I constantly exhibited this electro-magnet in my lectures, both here and in the State of Maine, and spoke of it as applicable to the transmission of intelligence.

5. Please state, if you are able, by whom the idea of transmitting intelligence by electro-magnetism, or by electricity, was first conceived; and what information, or means of information, you possessed when on board the Sully.

Answer. So far as I know, the idea of transmitting intelligence by electro-magnetism was first suggested by Ampére, of Paris, as appears in a work entitled "Expose des nouvelles découvertes sur Electricité et la magnetisme, de MM. Œrsted, Arago, Ampere, H. Davy, Bést, Erman, Schweiger, de la Rive et al," par MM. Ampére et Babinet, published in Paris, in 1822. I had this book on board the Sully, but had not read it. At that time, from my own experiments, and those of Pouillet, I had become perfectly familiar with all that could be done by electro-magnetism, so far as then known. The telegraph was an application of well ascertained principles, and my familiarity with the subject enabled me to suggest plans and details at once without premeditation, as soon as my attention was called to it. The book above mentioned is identified by my name and the initials of the magistrate on the cover.

6. Please state at what time Mr. Morse's claim to the exclusive invention of the Electro-magnetic Telegraph first came to your knowledge, and what steps, if any, you took in regard to that claim.

In 1837, in August, I first heard that Mr. Morse had set up a claim to the exclusive invention of the magnetic telegraph. It was in a letter to me from him, dated August 28, 1837, in which he spoke of it as his telegraph. Afterwards, I saw a short paragraph in a New York newspaper, stating that the credit of the invention was wholly due to

their townsman, S. F. B. Morse. I wrote Mr. Morse a strong remonstrance, and claiming the invention as principally belonging to me. He replied, and I rejoined, and several letters passed between us. I heard that Mr. Morse had sent an article on the subject to the American Journal of Science and Arts, and I wrote to Professor Silliman that I should make a reply if it appeared, and I understood the article was withdrawn. I also wrote a letter to a member of the Academy of Sciences, Mons. Elie de Beaumont, denying Mr. Morse's exclusive claim, having heard that he had set it up before that body. An article appeared in 1839 in the Boston Post from memorandums furnished by me in defence of my claim. To this, Mr. Morse replied in the same paper. I prepared a rejoinder, but the editor dissuaded me from printing it, saying that the controversy would be long, and that as I did not seek a patent, I had no object to engage in it. He offered to publish the article however if I desired it, but I thought best to withdraw it. From the time I first heard of Mr. Morse's application for a patent, up to the present time, I have constantly and publicly denied his right to it upon the ground that he was not the original inventor.

7. Please state any other matters you may know material to either party to this suit in relation to the invention of the telegraph.

At the time that these conversations took place, and for some years afterwards, I was aware that electro-magnetic telegraph could not be rendered commercially valuable for want of a sustaining battery, or one that would keep up a steady and uniform current of electricity, no such battery being at that time known. Professor Daniels, of London, invented the first constant or sustaining battery about 1839, and Grove's platinum constant battery, which is still better, was not invented until a year or more after that of Daniels. These or similar batteries are essential to the economical use of the electro-magnetic telegraph so as to make it available for common purposes, although the practicability of such a telegraph could be and was demonstrated by the aid of the batteries previously in use.

I would add, that I neither have nor have had any disposition to deny to Mr. Morse great credit for mechanical ingenuity and facility in applying the successive inventions in the arts, such as the batteries above mentioned, to the purposes of the telegraph. He did mature and put into operation a telegraph, either by his own ingenuity or with the aid of others, and improved the system of characters or signs for an alphabet. I only mean in this deposition to assert that he is not the original and exclusive inventor.

I wish to add that my experiments with Deville were not made with the iron electro-magnet, which was not then invented, but with copper helices and coils rendered magnetic by a galvanic battery.

Mr. Morse, as an apology for not knowing any thing about electro-magnetism, said that he had paid no attention to the subject, being wholly occupied with painting and the fine arts.

The following are the names of the passengers who were with me on board the Sully: William C. Rives and family, Mrs. Palmer and Miss

Palmer, Mr. Charles Palmer, Mr. William Palmer, Mr. Frederick Palmer, Mr. S. F. B. Morse, Mr. and Mrs. Bargy and child, Dr. Hazlitt, U. S. N., Mr. L. Rogers, of Virginia, Mr. J. F. Fisher, of Philadelphia, Mr. W. Post, of New York, Mr. Constable, of New York, Mr. J. De la Lande, Mr. Chazal, and Mr. A. F. Scheidler.

8. Please state whether or not you are acquainted with the Columbian telegraph, and that patented by Mr. Morse; if you are, state whether any, and if any, what differences exist between them.

Answer. The instrument for which Mr. Morse holds a patent is an iron electro-magnet, attracting by means of electro-magnetism produced by a galvanic battery attracting an iron keeper which connects the poles of the electro-magnet; and the power which separates the keeper from the electro-magnet, when it is not rendered magnetic, is a steel spring, but was originally a weight.

In the Columbian telegraph permanent magnets are employed as a power, and these permanent magnets are not dependent on electro-magnetism produced by chemical means or by any galvanic battery, for the magnetic power may be derived directly from the earth's native magnetism by induction, or be taken from native magnetic iron ores. The only use made of electro-magnetism, or magnetism derived from a galvanic battery, in the action of this instrument, is in annulling or neutralizing the power of the native magnetism of the steel permanent magnets upon the armature, while a steel spring draws it away. This description applies to the mutator of the Columbian. In the register the electric currents of two local circuits are employed to change the polarities of the armature moving between the two opposite magnets so as to enable them to work it and the marker by the alternate attraction and repulsion of permanent magnetism. This instrument is in its principles and construction altogether different from that patented by Mr. Morse, and the power operating is permanent magnetism and not electro-magnetism. Electro-magnetism is employed as a check or opposing force to temporarily neutralize the permanent magnetism of the steel magnets. This opinion I have derived from an examination of the drawings of the instruments laid before me, which are identified by my initials and those of the magistrate. I am informed that the Columbian telegraph is not so liable to be affected by atmospheric electricity as that patented by Mr. Morse. If such is the fact, then this is on that account superior to that of Mr. Morse.

CHARLES T. JACKSON.

Sworn to before me, August 23, 1849.

GEORGE S. HILLARD, *Commissioner.*

Deposition of George W. Benedict.

1. What is your age, occupation and residence?

Answer. My age is fifty-three years. I have resided for the last twenty-four years in Burlington, Vermont. My employment, save for about

two years just past has been that of a professor in the University of Vermont. It fell within my department of instruction to teach natural philosophy and chemistry. In particular for many years I taught the sciences of electricity and galvanism, of magnetism and electro-magnetism, keeping myself acquainted with what was published on those subjects in several of the most important scientific journals published in Europe and America, and being accustomed to use for instruction and investigation many instruments pertaining to those sciences, and occasionally to make for my own purposes such instruments.

2. Are you acquainted with Morse's telegraph and the Columbian telegraph? If so, in what respects, if any, do they differ or agree?

Answer. I have seen many instruments in use on telegraph lines, commonly called Morse's telegraph instruments, and consider myself well acquainted with them. I once saw what was said to be the Columbian or Barnes and Zook's telegraph instruments, but they were not in use at the time, and the few minutes of time at my disposal did not allow me to examine them completely. I judge the drawings now before me, on which I have placed my initials, said to be the drawings of the Columbian instrument, to be drawings of instruments like those which I saw. I understand the drawings in all their particulars, and consider myself competent to form an opinion of the relations of instruments so constructed, and of their practical working.

In making a comparison between the Morse telegraph apparatus, and the Columbian or Barnes and Zook's telegraph apparatus, as exhibited in the drawings before me, I lay aside all consideration of the combinations of weight wheels, and fly wheels, for the purpose of carrying forward with regularity the paper used in telegraphing. I consider these combinations as substantially the same in both instruments, and as being neither more nor less than the well known arrangements for the striking part of a clock. The carrying of the paper forward between rollers moved by wheel work is, and has been for a long time, in use in paper and cloth factories. I shall confine myself to the apparatus for giving proper motion to the writing point, and to the connexions with the electric or galvanic forces made use of.

1. I compare in the first place the registering apparatus or registers, as commonly called, of the two instruments. In Morse's register the motion of the writing point in one direction is caused by the action of an electro-magnet, when charged by a constant galvanic battery, or a vibrating bar of soft iron attached firmly to the writing point. On completing the connexion between the ends of the spiral conducting wire which surrounds the soft iron of the electro-magnet and the extreme metals of the battery (that is, on closing the circuit as the common phrase is) the electro-magnet becomes energetic and attracts the aforesaid vibrating bar of soft iron, and gives it motion in one direction. Of course the writing point moves with it also in one direction. When the circuit is opened (that is, when the connexion with the battery is interrupted) the electro-magnet loses its energy mainly. The vibrating bar of soft iron is attracted not at all, or in a comparatively slight degree.

A spring or weight then carries the said bar in a direction opposite to the one which it took before; of course the writing point moves also in an opposite direction to which it moved before.

In the Columbian register the motion of the writing point in both directions, the one opposite to the other, is caused by the action of permanent magnets (that is, magnets made of hardened steel or iron, which when magnetized retain their magnetic state of themselves for an indefinite time) or a vibrating electro-magnetic bar attached firmly to the writing point. The four poles of these permanent magnets are in the same plane, or nearly so, with the axis of the aforesaid vibrating electro-magnetic one. The two poles on either side of it are dissimilar to each other, and each pole on one side of it is dissimilar to the corresponding pole, so far as position is concerned on the other side of it. The spiral conducting wire of the said electro-magnetic bar is brought into connexion alternately with two distinct constant galvanic batteries, reversely situated in their relation to the said wire, so that when the connexion is made with one of these batteries, the galvanic current proceeds in one direction in the said wire, and when the connexion is made with the other battery, the galvanic current proceeds in the opposite direction in the said wire. When, then, the circuit is closed for one battery (it, the circuit, being at the same time open for the other battery) the electro-magnetic bar aforesaid becomes bi-polar in a certain direction, in which condition it is urged by the simultaneous action of the four poles of the permanent magnets in one direction. Next, the circuit which was closed before is opened, and simultaneously the circuit which was open before is closed. The electro-magnetic bar now becomes bi-polar, but reversely to what it was before. The four poles of the permanent magnets by their simultaneous action now urge the electro-magnetic bar in a direction opposite to the one which it took before. The motions of the attached writing point are consequently first in one direction and then in an opposite one.

2. Morse's register is practically combined with what is called the receiving or relay apparatus. This is identical in its essential character with the register, save that no writing point is attached, and the vibrating bar of soft iron is used by its alternate motion to close and open successively the circuit of the register battery. The receiving apparatus has its own constant battery for putting its electro-magnet in an energetic state. The connexions with the batteries used are identical in the two instruments.

The Columbian register is practically combined with what is called the mutator. In this a spiral conducting wire surrounds a vibrating piece of soft iron of what is called a U shape, which is suspended before the poles of a permanent magnent, and can move freely in the axis of the tubes formed by the spiral conducting wire. This wire, if disconnected with a constant galvanic battery which pertains to the mutator, exerts no influence on the aforesaid U piece of soft iron, which is left free to the influence of the permanent magnet aforesaid. It is of course attracted by the permanent magnet, and made to move towards

it. But when the wire aforesaid is brought into connexion with its proper bartery just referred to, the relation of the battery to the wire is such that the energy of the wire is employed wholly or partially, the attractive force of the permanent magnet so far as it is exerted on the vibrating U piece, before mentioned. The counteraction of a spring or weight then suffices to draw the said U piece in a direction opposite to the one which it took from the attractive force of the permanent magnet. By the motion of the vibrating U piece in one direction, one of the galvanic circuits of the register is closed, and the other circuit is opened. By the motion of the same U piece in an opposite direction, the register circuit which was before closed is now opened, and simultaneously the one which was open before is now closed. The alternate motion of the writing point of the register is the result as explained when the register was considered.

3. I consider Morse's register, and Morse's receiving apparatus, to be, each of them, simply electro-magnetic instruments, combined with the well known counterspring or weight. No permanent magnets are used in them. The introduction of permanent magnets in place of the electro-magnet would be fatal to their action. I consider the Columbian register to be combined of permanent magnets and an electro-magnet, this last being made to move alternately in one direction, and its opposite, by the energy of the four poles of the permanent magnets, it being fitted to yield to this energy by being made bi-polar first in one direction, and then in an opposite direction, through the influence of two distinct and oppositely arranged constant galvanic batteries, alternately brought singly into connexion with the said electro-magnet by the action of the mutator.

4. I consider the Columbian mutator to be a combination of a permanent magnet arrangement, and of a common counterspring or weight with an electro-magnetic arrangement, the moving forces being the permanent magnet on the one hand, and the counterspring or weight on the other hand. The influence of the battery, connected with the electro-magnetic arrangement belonging to the mutator, is entirely different from the influence of the battery in Morse's register or relay apparatus. In the Morse instruments the battery force endows the electro-magnet with an energy whereby it moves the vibrating bar of soft iron. In the mutator the battery force seems to free the moveable U piece of soft iron from the motive power of the permanent magnet, whereby the said U piece is left free to obey the action of the counterspring or weight.

5. To my mind the two parts of the Columbian telegraph apparatus, namely, the register and the mutator, are each of them very different from the register and receiving apparatus of Morse's telegraph machine taken singly, and the combination of the register and mutator makes, as a whole, in my mind, a very different machine from the combination seen in the united action of Morse's register and Morse's receiving magnet. I should as soon call a magnetic needle and an electro-

magnet the same machine, as I should call Morse's telegraphic apparatus and the Columbian telegraph machine the same machine.

To sum up my judgment respecting the two instruments, in general terms, I consider them different essentially; because, first, the chief motive power in the Morse register and in the Morse receiving apparatus is electro-magnetism solely, the subordinate power being in the counterspring or weight; whilst in the Columbian register the motive power for both directions is that of permanent magnets acting on an electro-magnetic bar successively polarized in contrary directions; because, secondly, in the working of the Morse register one battery produces successively the same effect, causing the iron of the electro-magnet to be polarized always in the same direction, if polarized at all; whilst in the Columbian register, two batteries, acting in reverse directions, polarize the iron of the electro-magnetic bar alternately in reverse directions; because, thirdly, in the Columbian mutator the motive power for one direction is that of a permanent magnet only, the opposite power being that of the counterspring or weight, (and in this case I do not consider either motion as probably subordinate to the other, since they both need to act with force, in order that both circuits may be completely closed;) and because, fourthly, the combination of the Columbian mutator with the Columbian register is quite different from the combination of the Morse relay with the Morse register, is formed for an entirely different purpose, and accomplishes an entirely different result.

GEORGE W. BENEDICT.

Sworn to before me, August 30th, 1849.

GEO. S. HILLARD,
Commissioner.

Deposition of Chamberlain.

Deposition of Nathan B. Chamberlain.

1. What is your age, residence, and occupation ; and how extensively have you been engaged in it?

Answer. I reside in Boston; I am forty years old; I am a general philosophical instrument maker; I have been engaged in the business for eighteen years. We dispose of the work of thirty men; we have sent out between four and five hundred thousand dollars' worth of work since I was in the business; we have furnished philosophical instruments to all the colleges in the United States of which I have any knowledge; also to West Point, and to King's college, in New Brunswick. All the apparatus sent out by the foreign mission board into China and the islands of the Pacific, and their other establishments, are furnished by us. We have a large assortment of philosophical instruments at Constantinople in use at the station of the American mission; and the first magnetic telegraph exhibited in Turkey, was made by me.

2. Are you acquainted with the principles, construction, and mode

of operation of the electro-magnetic telegraph, patented by S. F. B. Morse? If yea, describe them.

Answer. I think I am acquainted with its principles. The construction has been modified from time to time, but the principles and mode of operation have continued substantially the same. It was, and is, strictly electro-magnetic in its principle, in contradistinction to magneto-electric, which is of late date; and also to telegraphs worked by permanent magnetism.

Mr. Morse's telegraphic machine is worked by being connected with a galvanic battery, and disconnected from it. When the connexion is established, the electric current flows through or around coils of wire encircling a soft iron U magnet, which attracts its armature or keeper; when the connexion is broken, the armature or keeper is withdrawn or retracted by the action of a spring; originally this was done by the weight of one end of the lever. The spring has been added to make it more efficient. At the end of the long arm of the lever was originally a steel point on the upper side, which steel point fell into a groove in a roller, which was sustained above that point. When the magnet was not in action this point dropped away from the groove; when the magnet was in action the point was pressed into the groove in the roller. That point we call the registering point, and it registers by being pressed against a strip of paper which intervenes between the roller and the registering point. So long as the magnet is in action, the point above described is pressing the paper into the groove of the roller, and makes a dot or line, according to the length of time the action is continued, the paper being drawn slowly between the roller and the point by the action of some gear or clock-work.

3. Are you acquainted with the telegraphic instrument known as the Columbian Telegraph? If yea, describe its construction, principles, and mode of operation. Please look at the drawings now exhibited to you, and identify them by your initials; and state what machine or instrument they represent.

Answer. I am somewhat acquainted with the Columbian Telegraph, and could construct one. I think I understand its principles perfectly. The drawings now exhibited [to] me represent this machine. I should call it a magneto-electric machine. It is worked by two powers, both magneto-electric and electro-magnetic. The electric current, generated from the battery, affects only the vibrating armature, with polarities similar to those of the permanent magnet; so that the armature is withdrawn from contact with the permanent magnet by a spring; when the current is broken, the armature is attracted by the permanent magnet, the electro-magnetic current ceasing to operate upon it. The instrument is worked by the motive power of the permanent magnet, the electric current being used only to put the armature in a condition to be so worked. This description applies only to the mutator of the Columbian Telegraph. This mutator differs from Morse's receiving magnet in its peculiar construction; first, in the power by which it is worked, Morse's instrument being worked by the motive power of electro-mag-

netism, simply; whereas, this is mainly dependent upon, and worked by, the motive power of permanent magnetism; second, in the arrangement of the parts of the machinery; third, in the general character or result of the machine, this machine not being liable to be affected by atmospheric electricity. The employment of the power of electro-magnetism in connexion with that of electro-magnetism, renders it less liable to the action of atmospheric electricity, and overcomes difficulties which impair the value of Morse's telegraph, which in some days, when the atmosphere is charged with electricity, can be worked only a small part of the time.

The register of the Columbian telegraph is worked substantially upon the same principles with the mutator by the power of permanent magnetism, and differs from the register of Morse's in the same particulars as the mutator differs from the receiving magnet. It is worked by the power of permanent magnetism, the electric currents from the batteries of two local circuits being employed to change the polarity of the armature, so that it is attracted and repelled alternately by the two opposite permanent magnets.

In my opinion the Columbian telegraph is entirely distinct in principle and mode of operation from Morse's telegraph, and I consider the Columbian telegraph as decidedly the best machine of the two. The employment of the roller worked by clock work or equivalent powers, for the purpose of passing paper or other material before a marking instrument, is not peculiar to either machine; but simply a new application of a familiar process used in calico printing, paper staining, and the like, before the invention of either telegraph.

N. B. CHAMBERLAIN.

Sworn to before me August 28th, 1849.

GEO. S. HILLARD,
Commissioner.

Deposition of Joseph A. Abbott.—Deposition of Joseph A. Abbott.

1. Please state your age and residence, and what acquaintance, if any, you have with the subjects of electricity and electro-magnetism.

Answer. I am forty-six years old; I reside in Boston; I should think as early as 1834 or 1835, certainly ten years ago, I made electro-magnetism a subject of particular study, and have lectured on it in public. I have given much attention to electricity for many years, and have often lectured upon it. Of late years my attention has been called to other things, but I have occasionally given attention to these.

2. Please state whether or not you have made any investigation as to the progress of discovery in electro-magnetism, and especially as to the introduction of the electro-magnet into the country; if you have, state the results of your inquiries, and what led to them.

Answer. Between one and two years ago Mr. Daniel Davis, jr., lent me Vail's pamphlet on the Electro-magnetic Telegraph, which contains a letter written by Mr. Morse, in which he says that he derived his first knowledge of electro-magnetism from the lectures of Mr. J. F. Dana, delivered in 1826.

Entertaining doubts whether any accounts of the electro-magnet had been published in any scientific journal at that time, I was induced some days afterwards, while at the library of the American Academy, to examine the scientific journals in the library to ascertain the fact. The earliest account I was then able to find of any electro-magnet was that contrived by William Sturgeon, republished in the Annals of Philosophy, vol. 12, new series, in the number for November, 1826. More recently I have investigated the subject further, and I found a description of Mr. Sturgeon's electro-magnet in the "transactions of the society instituted at London for the encouragement of arts, manufactures, and commerce," vol. XLIII, page 48, which volume was published at London in 1825. For that electro-magnet, and other electro-magnetic apparatus, Mr. Sturgeon received, as it appears from the preface, "the large silver medal and thirty guineas."

The following is a literal copy of Sturgeon's description and figure of his electro-magnet in the volume aforesaid:

"Figs. 13 and 14, a front and side view of a stand with two connecting cups, Z and C, made of wood, in which the bent iron wire, wound round with copper wire, is supported by the two copper wire ends. On making the galvanic connexion through the copper wire, the iron wire becomes a strong horse-shoe magnet, and will support a heavy bar of iron, as y, fig. 14; but on lifting the connecting wire a, fig. 13, out of the cup Z, the weight immediately drops, and on restoring the connexion the power is restored; then if you change Z for C it will change N for S, or if you only wrap the copper wire about the the iron wire as a right threaded screw instead of a left one, as in the drawing, it will change N for S."

The same account of Sturgeon's electro-magnetic apparatus, including that of his electro-magnet, was republished in the Annals of Philosophy as herein before stated; and this account, it is believed, cannot be found republished in any other scientific journal, at least previously to 1832. Dr. G. Moll, professor of natural philosophy in the University of Utrecht, describes in Brewster's Edinburgh Journal of Science, vol. III, new series, 1830, an electro-magnet capable of lifting 154 pounds. He says it was suggested by one made by Sturgeon, and seen by himself in 1828 at Mr. Watkins'.

The following is a copy of a part of the statement or description by Professor Moll in the article above mentioned:

"In the transactions of the society for the encouragement of arts, manufactures, and commerce, Mr. Sturgeon, of Woolwich, has given a description of an elegant and curious apparatus, with which many striking electro-magnetic experiments may be performed; among these is a soft iron wire, bent in the form of a horse-shoe, wound round with copper wire. The ends of this copper wire being made to communicate with the opposite poles of a galvanic apparatus the iron becomes a strong horse-shoe magnet, capable of supporting a heavy bar of iron; on lifting the connecting wire out of the cups the force is immediately de-

stroyed, and again restored on plunging the connecting wire of the battery again in the cups.

"This apparatus I saw in 1828 at Mr. Watkins', curator of philosophical apparatus to the London University, and the horse-shoe with which he performed the experiment became capable all at once of supporting about nine pounds.

"I immediately determined to try the effect of a large galvanic apparatus on a bent iron cylindrical wire, and I obtained results which appear astonishing, and are, as far as the intensity of the magnetic force is concerned, altogether new. I have anxiously looked since that time into different scientific continental and English journals, without finding any further attempt to extend and improve Mr. Sturgeon's original experiment."

Prof. Henry's very powerful electro-magnet is described in Silliman's Journal of Science, vol. xix, 1831. No account of Sturgeon's electro-magnet, or of any other, has been found previously published in Silliman's Journal, or in any of the scientific journals published after the year 1825, and previously to 1830, belonging to the library of the American Academy, including all the principal ones in the English language.

I think it not at all probable that Mr. Dana could have lectured on an electro-magnet in 1826, because the work in which the account is originally given is not one which men of science in this country would be likely to take, because it is not one in which men of science usually publish original scientific communications. The sole reason for Sturgeon's account being published in that work was, that he offered his electro-magnet to the society for a premium. In the preface to the volume containing Sturgeon's account, it is stated that "the contents of the present volume consist, for the most part, of descriptions and notices of the various subjects for which the society have bestowed medals or pecuniary rewards, during the last session."

The germ of the discovery of the electro-magnet is contained in the following extracts, comprising an account of the experiments and discoveries of Arago.

The following extract is taken from the "Annales de Chimie et de Physique, par M. M. Gay Lussac et Arago. Tome Quinzième." Paris, 1820. It is copied from page 82:

"Séance du Lundi, 25 *Septembre*, (1820.)

"M. Arago annonce avon remarque que le fil conjonctif qui établit la communication entre les deux de la pile de volta se charge de semaille de fer, comme le ferait un aimant. Ce fil n'agit donc pas sentement sur les aiguilles dejà aimantées, mais il developpe encore le magnétism dans le fer, qui n' a pas été sommé à une aimantation préalable. Aussi des aiguilles de boussoles non aimantées, sont elles devices par l'action du fil conjonctif."

The following is a literal translation of the extract:

"Monday session, *25th of September*, (1820.)

"M. Arago announces having remarked, that the conjunctive wire which establishes the communication between the two poles of the voltaic pile, takes up iron filings like the magnet. This wire does not act, then, solely on needles already magnetized, but it also developes magnetism in iron, which has not been subjected to previous magnetization; also, compass needles, not magnetized, are deflective by the action of the conjunctive wire."

The following extracts are from a note to a letter from Sir Humphrey Davy, Bart., F. R. S., to W. H. Wallaston, M. D., on the magnetic phenomena produced by electricity. The note is on the 18th page of "Philosophical transactions of the Royal Society of London, for the year 1821:

"All the experiments detailed in this paper, except those mentioned, page 15, were made [in] the course of October, 1820. I find by the Annales de Chimie et de Physique for September, which arrived in London, November 24, that M. Arago has anticipated me in the discovery of the attractive and magnetizing power of the wires in the voltaic circuit."

3. Can you state any other matter or thing relating to the subject of this deposition? If so, please state the same as fully as if specially interrogated thereto.

Answer. I wish to state further, in corroboration of the opinion I have expressed of the improbability of Mr. Dana's having introduced into his lectures, in 1826, any mention of the electro-magnet, that is, of a bar of soft iron, straight or bent, surrounded by a coil of wire, and rendered magnetic by a current of voltaic electricity circulating through that coil, that the aforesaid volume of the "Transactions" contains letters, dated at various times in 1825; among which is one commencing on page 217, dated December 19, 1825, and the whole volume consists of 375 pages. These facts, together with the acknowledgments in the aforesaid volume, among the "presents received by the society," of several works published for the year 1825, prove, I think, that Sturgeon's original account of his electro-magnet could not have been published before the last of December, 1825; probably not till some time in 1826. I would further state, that the society, as it appears from the aforesaid volume, consists of elected members, and published an annual volume of its proceedings, seldom containing any purely scientific articles; and that its "Transactions" is not a publication, therefore, likely to have been imported or sought for by a scientific man. No account of Sturgeon's electro-magnet could have arrived in this country before late in the winter of 1825–'26, even in this publication. The republication of the account of Sturgeon's electro-magnet, in the November number of the Annals of Philosophy, the first and the only republication that I have been able to find likely to have fallen under the notice of a scientific man, in this country, could

not, probably, have arrived at New York before some time in December, 1826.

I would add, that I have examined published catalogues of the libraries of many of the principal institutions of New England, and have been unable to find that the aforesaid volume belongs to but two of those libraries, besides that of the Academy of the American Arts and Sciences.

JOSEPH HALE ABBOTT.

Affirmed to before me, August 28th, 1849.

GEO. S. HILLARD,
Commissioner.

I have compared the extracts contained in the foregoing depositions with the originals, and certify that they are correct copies.

GEO. S. HILLARD,
Commissioner.

Deposition of B. A. Gould, jr—*Deposition of B. A. Gould, jr.*

1. What is your residence and occupation?

Answer. I reside in Cambridge, and am engaged in astronomical researches and studies.

2. Please state what you know of the history of telegraphic invention in Germany, and the sources from which you derive your information?

Answer. The first use of electro-magnetism for telegraphing in Germany, of which I am cognizant, was suggested by Gauss, and carried out by Gauss and Weber, in Gottingen, in 1833. The line of wire used extended from the observatory to the physical cabinet, about three-quarters of a mile, and returned again to the point of departure; the one wire forming the entire circuit. This was, however, so coiled that its entire length was about ten miles; a part of these wires was melted by lightning about eight years ago, but the portion leading from the observatory to the town stile remains as when erected, and I have seen them daily for more than a year. The first printed allusion to it by Gauss was in 1834. He has several times since written on the subject, and described more minutely the apparatus he then used, and his results. From this it appears, *from this it appears*, that he was accustomed to use the line of telegraph, not only to compare the indications of magnetometers and the rate of clocks, but also to communicate words and messages. This he has, moreover, described to me orally, as also has Professor Weber, who lived from 1837 to 1848, in Leipsic. Steinhiel was, if I am not mistaken, present at many of these experiments; and has, in many printed papers, borne his testimony to the fact. It is my firm belief that the first use any where of the telegraph for permanently recording signs was by Steinhiel, who devoted himself to perfecting the electro-magnetic telegraph, while Gauss continued his

researches with a view especially to further theoretical discoveries. In Schümacher's Astronomical Almanac for 1836, is a detailed account by Gauss of his whole course of discovery. I have Gauss's word that this paper was sent to the editor ten months before its appearance.

From Schümacher's Astronomical Almanac for 1836, published in 1836, I translate the following passages:

P. 38. "By a contrivance, called a commutator or gegrotop, the direction of the current can be instantaneously changed to the opposite one, or the current itself interrupted, which has a corresponding effect on the motion of the needle. By these arrangements the motions are so entirely under our command that we can use them for telegraphic signals, which can be given in perfect independence of the time of day, and of the weather, in a closed room, and received in the same way. Frequent trials to signalize entire words and short phrases in this way have met with the most perfect success. What is here only an interesting physical experiment might, as we can safely assert, when executed on a much larger scale, and with the application of strong galvanic batteries, or other electro-motive power of strong multipliers and strong conducting wires, be used for telegraphic communications at a distance of ten, twenty, or more (German) miles at one operation."

P. 39. "In general nothing appears to stand in the way of the extension of electro-magnetic telegraphing, even to immense distances, except the increase of expense; since longer distances, to be traversed by the galvanic current, without intermediate stations, require thicker conducting wires."

From the account of the centennial celebration of the University of Gottingen, published in 1838, I translate the following passages:

"By many experiments, the whole length of wire amounted to forty thousand feet, or about two German (or ten American) miles. It must, moreover, be remarked, that by far the greatest part of this wire is very thin, and that this length, as far as the strength of the current is limited by it, is equivalent to a wire eight German (or thirty-six American) miles long, of the same size as that of the wire connecting the observatory and the physical cabinet. In spite of the length of the circuit, the slightest galvanic force gives to the heavy magnet not only a perceptible deflection, but one sufficient for accurate measurement."

"In order to show still further the advantage of the new apparatus over the magnetometer for electro-magnetic telegraphing, the manner in which telegraphic signs can be produced by galvanic currents must first be more nearly considered."

"As soon as it was known that the action of a voltaic pile could propagate itself through a very long circuit, the thought was very near at hand to use these powers of nature for telegraphic purposes, and so long as about thirty years ago;* at a time, therefore, when only a small

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NOTE.—* According to the information given me by Mr. Von Humboldt, Retancourt had, even ten years earlier, put up a line of wire from Aranjuez to Madrid, by means of which the discharge of a Leyden jar should serve as a telegraphic signal.

part of the galvanic force was understood, Sœmmering proposed the evolution of gas for this purpose; but the magnetical influence of galvanic currents, which has since become known, is far better adapted for complicated signalizing; yet it is remarkable that since Oersted's discovery, a considerable number of years has elapsed before any one seems to have thought of this use. A sound judgment concerning the applicability, on a large scale, is, it is true, impossible without an accurate quantitative knowledge of the weakening of galvanic currents in consequence of the length and construction of the conducting wires; of which our ideas were very erroneous and imperfect before Ohm and Fechner.

"After, in the year 1833, (chiefly in order to institute on a large scale similar investigations concerning the law of strength of galvanic currents under different circumstances,) a wire connexion was made between the observatory and the physical cabinet, (the merit of the difficult execution of which belongs exclusively to Prof. Weber;) the circuit was, from the very beginning, often used for telegraphic signals, not merely for simple ones to compare the time pieces daily, but also, experimentally, for complicated ones; and the possibility of signalizing letters, words, and whole phrases thus became, even then, an evident fact."

Although more particular circumstances concerning the result do not seem to be known, yet there can be no doubt of the success of such an experiment if well made. But such a method would yet always remain limited to the signalizing a "yes" or a "no" to questions previously agreed on.

BENJ. APTHORP GOULD, Jr.

Sworn to before me, August 31st, 1849.

GEO. S. HILLARD,
Commissioner.

Deposition of Jos. Tracey.

Deposition of the Reverend Joseph Tracey.

1. What is your age, residence, and occupation?

Answer. I am upwards of fifty years old; I reside in Beverly, near Boston, and my place of business is in Boston; I am a regularly ordained clergyman of the Congregational denomination, and am Secretary of the Massachusetts Colonization Society.

2. Please state whether or not you had, between the years 1832 and 1840, any conversation with Sam. F. B. Morse in relation to the electro-magnetic telegraph; if any, when, and what was it?

Answer. I had frequent conversations with Mr. Morse on this subject, during the period between May, 1837, and the end of the year 1838, and at many subsequent times. Soon after Dr. Jackson's claim to the credit of the invention was made public, Mr. Morse gave me the origin of the invention. He said it was during a voyage from Europe in the

packet ship Sully, and the Hon. W. C. Rives and others, whom I do not now recollect, were passengers with them. Mr. Morse stated to me that the science of electro-magnetism was then a late discovery, and was a subject of much conversation among the passengers; that Dr. Jackson had obtained a better knowledge of it than any other of the passengers, and imparted that knowledge freely in those conversations. Mr. Morse stated that, during these conversations, the question arose whether electro-magnetism might be applied to the conveyance of intelligence, and it also became a subject of common conversation among the passengers. Mr. Morse said he did not recollect who first started that question, or whether it had not been previously started in Europe. Mr. Morse told me that, during these conversations, he himself devised machinery by which intelligence might be communicated by electro-magnetism, and that he actually constructed a part of it during the remainder of the voyage. He told me that the machinery which he then devised, though it was afterwards improved, was essentially the same which he afterwards put in operation as a magnetic telegraph. Mr. Morse claimed the invention of that machinery as exclusively his own; but he freely acknowledged his obligations to Dr. Jackson for the knowledge or much of the knowledge of electro-magnetism which enabled him to make the invention.

JOSEPH TRACEY.

3. Please state how long you have known Mr. Morse, and what your relations with him have been during that period; whether friendly or unfriendly, intimate or otherwise.

Answer. I have known Mr. Morse since 1837; I have always been on friendly relations with him, and feel well acquainted with him.

4. Please state whether or not you have ever stated to any person that Mr. Morse told you that all the knowledge he had of electro-magnetism, at the time of his voyage home in 1832, was derived from conversations with Dr. Jackson on board the Sully.

Answer. I have no such recollection; still I may have said what was so understood. The fact is, that I have had the impression that Mr. Morse had no previous knowledge of the science beyond the fact that there was such a science; but I am not sure that this impression was derived wholly from his conversation at the time referred to, or at any other time. In a conversation with Mr. J. H. Abbott, to which my attention has been directed, I think I expressed that impression, but cannot testify as to the exact language used.

JOSEPH TRACEY.

Sworn to before me, August 25th, 1849.

GEO. S. HILLARD, *Commissioner.*

Deposition of C. Alger.

Deposition of Cyrus Alger.

1. What is your age, residence, and occupation? Please state whether or not you had any conversation or communication with Dr. Charles

T. Jackson, of Boston, on the subject of the Electro-magnetic Telegraph in 1832, or subsequently, prior to 1837; if you had, please state the same fully.

Answer. I am sixty-seven years old; I reside in Boston, and am engaged in the manufacture of iron. In 1832, late in the autumn, just after Dr. Jackson's return from Europe, I had a conversation with him on that subject. I fix the time, because Judge Haliburton, of Nova Scotia, was at my house, and I wished Dr. Jackson to see him before his return to Nova Scotia.

In this conversation Dr. Jackson spoke of the Electro-magnetic Telegraph, and seemed to be perfectly acquainted with the subject, describing its parts and mode of operation, and seeming to have the utmost confidence in the practicability of transmitting intelligence by it. He spoke of his drawings of the instrument, which he said he shewed to Mr. Morse on the voyage home in the Sully. I think he spoke of having made some drawings on the deck of the vessel. He spoke of the operation of the principle as a thing which Mr. Morse did not fully comprehend, and said that he found a good deal of difficulty in explaining to him how the thing would work.

Dr. Jackson then predicted from this invention the results which have since been accomplished by the magnetic telegraph. I have an impression that Dr. Jackson at that time made or exhibited rough drawings in explanation of his invention. When the controversy arose between Mr. Morse and Dr. Jackson, these things were brought to my mind, and I have frequently mentioned them in conversation, as shewing that the invention could not be exclusively Mr. Morse's.

I was at that time, and have been since, on intimate terms with Dr. Jackson, and have frequently applied to him for scientific information bearing on my own pursuits. He is a man of extensive scientific knowledge, which he freely imparts to all who seek it.

CYRUS ALGER.

Sworn to before me, August 28, 1849.

GEO. S. HILLARD, *Commissioner.*

Deposition of F. Alger.

Deposition of Francis Alger.

1. What is your age, residence, and occupation? Please state whether or not you had any conversation or communication with Dr. C. T. Jackson, of Boston, on the subject of the Electro-magnetic Telegraph in 1832, or subsequently, prior to 1837; if you had, please state the same fully.

I am forty years old, a resident of Boston, and am engaged in the manufacture of iron. I am acquainted with Dr. Charles T. Jackson, and have been acquainted with him since 1827. Upon his return from Europe, in 1832, I had much conversation with him upon scientific subjects. We were upon intimate terms, both being interested in the study of mineralogy, and we freely communicated to each other all our

scientific observations and acquisitions. I remember that, very soon after his return, within two days after his arrival in Boston, he spoke of a method or contrivance he had devised of communicating intelligence, or, as he said, of talking from one place to another by means of electricity. He said that they had had frequent scientific discussions on board the Sully on his voyage home, and that he had marked out on the deck of the vessel a plan for this communication of intelligence. I distinctly remember his spending an evening at my father's house, and giving a detailed account of this project. It continued to be a subject of frequent conversation between him and me for a considerable period after his return. It was evidently a matter which much occupied his time and thoughts, and I always thought he was going to reduce it to practice.

After Dr. Jackson's marriage, and while he was living in Hanover street, I went very often to visit him in his laboratory, which was in the upper part of his house. I think that he had a galvanic battery there, and was trying experiments in regard to this plan of communicating intelligence from one place to another. This was, to the best of my recollection, about two years after his return from Europe. He was full of the subject at that time.

FRANCIS ALGER.

Sworn to before me, August 25th, 1849.

GEO. S. HILLARD, *Commissioner.*

Deposition of H. Bigelow.

Deposition of Horatio Bigelow.

1. What is your age, occupation, and place of residence?

Answer. I am thirty-five years old; I reside in Boston, and am a member of the bar.

2. Please state whether or not you had any conversation with Dr. Charles T. Jackson on the subject of the Electro-magnetic Telegraph in 1832; if you had, when, where, and what was it?

I was in New York in the fall of 1832, at Brinker's hotel, and Dr. Jackson was there at the same time. He had just returned from Europe. He spoke to me several times of an invention or discovery which he had made, by which communications could be sent from one end of the Union to the other instantaneously.

This communication he said was to be effected by means of electricity, and he explained to me, at some length, the plan and mode of operation, but the particulars of this I cannot now recall. My impression is that wires were to be used for the electric current to pass over. Dr. Jackson talked to me very frequently about this, and predicted that I should see, in a very few years, the results which are now accomplished by the magnetic telegraph. Deeming his views so very extravagant I paid but little attention to them, and this is the reason why I have so indistinct a recollection of what he then told me with regard to the

mode of operation. The thing would doubtless have passed entirely out of my memory had I not actually seen accomplished what he then predicted.

HORATIO BIGELOW.

Sworn to before me, August 25th, 1849.

GEO. S. HILLARD, *Commis'r.*

Deposition of J. Henry.—Deposition of Joseph Henry.

1. Please state your place of residence and your occupation; also what attention, if any, you have given to the subjects of electricity, magnetism, and electro-magnetism.

Answer. I begin this deposition with the express statement that I do not voluntarily give my testimony, but that I appear on legal summons, and in submission to the law. I am secretary of the Smithsonian Institution, established in the city of Washington, where I now reside. The principal direction of the Institution is confided to me. As I do not expect to return to Washington until some time in October, I have been called upon to give my testimony here in Boston; on this account I labor under the disadvantage of being obliged to testify without my notes and papers, which are now in Washington.

I commenced the study of electro-magnetism in 1827, and since then have, at different times, within the last two-and-a-half years, when I became secretary of the Smithsonian Institution, made original investigations in this and kindred branches of physical science. I know no person in our country who has paid more attention to the study of the principles of electro-magnetism than myself.

2. Please give a general account of the progress of the science of electro-magnetism, as connected with telegraphic communication, and of any inventions or discoveries in electro-magnetism applicable to the telegraph, made by yourself.

Answer. I consider an electro-magnetic telegraph as one which operates by the combined influence of electricity and magnetism. Prior to the winter of 1819-'20, no form of the electro-magnetic telegraph was possible; the scientific principles on which it is founded were then unknown. The first fact of electro-magnetism was discovered by Oersted, of Copenhagen, during that winter. It is this: A wire being placed close above, or below, and parallel to a magnetic needle, and a galvanic current being transmitted through the wire, the needle will tend to place itself at right angles to it. This fact was widely published, and the account was every where received with interest.

The second fact of importance was discovered independently, and about the same time, by Arago, at Paris, and Davy, at London. It is this: During the transmission of a galvanic current through a wire of copper, or any other metal, the wire exhibits magnetic properties, attracting iron, but not copper filings, and having the power of inducing permanent magnetism in steel needles. The next important fact was

discovered by Ampere, of Paris, one of the most sagacious and successful cultivators of physical science in the present century. It is this: Two parallel wires, through which galvanic currents are passing in the same direction, attract each other; but if the currents pass in opposite directions, they repel each other. On this fact Ampere founded his ingenious theory of magnetism and electro-magnetism. According to this theory, all magnetic phenomena result from the attraction or repulsion of electric currents, supposed to exist in the iron at right angles to the length of the bar; and that all the phenomena of magnetism and electro-magnetism are thus referred to one principle, namely, the action of electrical currents on each other.

Ampere deduced from this theory many interesting results, which were afterwards verified by experiment. He also proposed to the French academy a plan for the application of electro-magnetism to the transmission of intelligence to a distance; this consisted in deflecting a number of needles at the place of receiving intelligence, by galvanic currents transmitted through long wires. This transmission was to be effected by completing a galvanic circuit. When completed, the needle was deflected. When interrupted, it returned to its ordinary position, under the influence of the attraction of the earth. This project of Ampere was never reduced to practice. All these discoveries and results were prior to 1823.

The next investigations relating to the magnetic telegraph were published in 1825; they were by Mr. Barlow, of the royal military academy of Woolwich, England. He found that there was great diminution in the power of the galvanic current to produce effects with an increase of distance; a diminution so great in a distance of two hundred feet was observed, as to convince him of the impracticability of the scheme of the electro-magnetic telegraph. His experiments led him to conclude that the power was inversely as the square root of the length of the wire. The publication of these results put at rest, for a time, all attempts to construct an electro-magnetic telegraph.

The next investigations, in the order of time, bearing on the telegraph, were made by Mr. Sturgeon, of England. He bent a piece of iron wire into the form of a horse-shoe, and put loosely around it a coil of copper wire, with wide intervals between the turns or spires to prevent them touching each other, and through this coil he transmitted a current of galvanism. The iron, under the influence of this current, became magnetic, and thus was produced the first electro-magnetic magnet, sometimes called simply the electro-magnet. An account of this experiment was first published in November, 1825, in the transactions of the society for the encouragement of the arts in England, and was made known in this country through the Annals of Philosophy for November, 1826.

Nothing further was done pertaining to the telegraph until my own researches in electro-magnetism, which were commenced in 1828, and continued in 1829, 1830, and subsequently; Barlow's results, as I before observed, had prevented all attempts to construct a magnetic tele-

graph on the plan of Ampere, and our own knowledge of the development of magnetism in soft iron, as left by Sturgeon, was not such as to be applicable to telegraphic purposes. The electro-magnet of Sturgeon could not be made to act by a current through a long wire, as will be apparent hereafter in this deposition.

After repeating the experiments of Œrsted, Ampere, and others, and publishing an account in 1828 of various modifications of electro-magnetic apparatus, I commenced in that year the investigation of the laws of the development of magnetism in soft iron, by means of the electrical current. The first idea that occurred to me in accordance with the theory of Ampere, with reference to increasing the power of the electro-magnet, was that of using a longer wire than had before been employed. A wire of sixty feet in length, covered with silk, was wound round a whole length of an iron bar, either straight or in the form of a U, so as to cover its whole length with several thicknesses of the wire.

The results of this arrangement were such as I had anticipated, and electro-magnets of this kind exhibited to the Albany Institute, in March, 1829, possessed magnetic power superior to that of any before known.

The idea afterwards occurred to me that the quantity of galvanism, supplied by a small galvanic battery, might be applied to develop a still greater amount of magnetic power in a large bar of iron. On experiment I found this idea correct. A battery of two and a half square inches of zinc, developed magnetism in a large bar sufficient to lift fourteen pounds.

The next suggestion which occurred to me was that of using a number of wires of the same length around the same bar, so as to lessen the resistance which the galvanic current experienced in passing from the zinc to the copper through the coil. To bring this to the test of experiment, a second wire, equal in length to the first, was wound around the last mentioned magnet, and its ends soldered to the plates of the same battery.

The magnet with this additional wire lifted twenty-eight pounds, or in other words, its power was doubled.

A series of experiments was afterwards made, to determine the resistance to conduction of wires of different lengths and diameters, and the proper lengths and number of wires for producing, with different kinds of galvanic batteries, the maximum of amount of magnetic development with a given quantity of zinc surface. For this purpose a bar of soft iron, two inches square and twenty inches long, weighing twenty-one pounds, and much larger than any before used, was bent in the form of a horse-shoe. Around this were wound nine strands of copper wire, each sixty feet long, the ends left projecting so that one or more coils could be used at once, either connected with a battery or with each other, thus forming several coils with several battery connexions, or one long coil with single battery connexions. The greatest effect obtained with this magnet, using a battery of a single pair, with a zinc plate of two-fifths of a square foot of surface, and all the wire arranged as separate coils, was to lift a weight of six hundred and fifty

pounds; with a large battery the effect was increased to seven hundred and fifty pounds. In a subsequent series of experiments, not published with the preceding, the same magnet was made to sustain one thousand pounds. When a compound battery was employed of a number of pairs, it was found that the greatest effect was produced when all the wires were arranged as a single long coil. I subsequently constructed electro-magnets on the same plan which supported much greater weights. One of these, now in the cabinet at Princeton, will sustain three thousand six hundred pounds with a battery occupying about a cubic foot of space. It consists of thirty strands of wire, each about forty feet in length.

The above mentioned experiments exhibit the important fact that when a galvanic battery of intensity (that is to say, a battery consisting of a number of pairs) is employed, the electro-magnet connected with it must be wound with one long wire, in order to produce the greatest effect; and that when a battery of quantity, (that is, one of a single pair,) is employed, the proper form of the magnet connected with it is that in which several shorter wires are wound around the iron. The first of these magnets, which is the one now employed in the long or main circuit of the telegraph, may be called an intensity magnet; and the second, which is used in the local circuit, may be denominated the quantity.

The quantity of electricity which can be passed through a long circuit of ordinary sized wire is, under the most favorable circumstances, exceedingly small, and in order that this may develop magnetism in a bar of iron, it was necessary that it should be made to revolve many times around the iron, that its effects may be multiplied; and this is effected by using a long single coil. Hence it will be seen that the electro-magnet of Mr. Sturgeon was not applicable to telegraphic purposes in a long circuit.

Previous to making the last experiments above mentioned, in order to guide myself, I instituted a series of preliminary experiments on the conduction of wires of different lengths and diameters, with different batteries. In these experiments a galvanometer, or an instrument consisting of a magnetic needle freely suspended within a coil of wire, was first employed to denote, by the deflection of its needle, the power of the current. The result from a number of experiments, with a battery of a single pair, was the same as that obtained by Barlow, namely, that the power diminished rapidly with the increase of distance. With the same battery, and a larger wire, the diminution was less. The galvanometer was next removed, and a small electro-magnet substituted in its place. With a single battery the same result was again obtained—a great diminution of lifting power with the increase of distance. After this the battery of a single pair was removed and its place supplied by one of intensity, consisting of twenty-five pairs. With this the important fact was observed, that no perceptible diminution of the lifting power took place, when the current was transmitted through an inter-

vening wire between the battery and the magnet of upwards of one thousand feet.

This was the first discovery of the fact that a galvanic current could be transmitted to a great distance with so little a diminution of force as to produce mechanical effects, and of the means by which the transmission could be accomplished. I saw that the electric telegraph was now practicable; and, in publishing my experiments and their results, I stated that the fact just mentioned was applicable to Barlow's project of such a telegraph. I had not the paper of Barlow before me, and erred in attributing to him a project of a telegraph, as he only disproved, as he thought, the practicability of one. But the intention of the statement was to show that I had established the fact that a mechanical effect could be produced by the galvanic current at a great distance, operating upon a magnet or needle, and that the telegraph was therefore possible. In arriving at these results, and announcing their applicability to the telegraph, I had not in mind any particular form of telegraph, but referred only to the general fact that it was now demonstrated that a galvanic current could be transmitted to great distances with sufficient power to produce mechanical effects adequate to the desired object.

The investigations above mentioned were all devised and originated, and the experiments planned, by myself. In conducting the latter, however, I was assisted by Dr. Philip Ten Eyck, of Albany. An account of the whole was published in the 19th volume of Silliman's Journal, in 1831, with the exception of the account of the large magnet afterwards constructed at Princeton in 1833, and the experiment mentioned of lifting a thousand pounds with one of my first magnets. While I was engaged in these researches, Prof. Moll, of the University of Utrecht, was pursuing investigations somewhat similar, and succeeded in making powerful electro-magnets, but made no discovery as to the distinction between the two kinds of magnets, or the transmissibility of the galvanic current to a great distance with power to produce mechanical effects. In fact, his experiments were but a repetition on a large scale of those of Sturgeon.

After completing the investigations above mentioned, I commenced a series of experiments on another branch of electricity closely connected with this subject. Among other things, I applied the principles above mentioned to the construction of an electro-magnetic machine, which has since excited much attention in reference to the application of electro-magnetism as a motive power in the arts.

In 1832 I was called to the chair of natural philosophy in the College of New Jersey, at Princeton; and, in my first course of lectures in that institution, in 1833, and in every subsequent year during my connexion with that institution, I mentioned the project of the electro-magnetic telegraph, and explained how the electro-magnet might be used to produce mechanical effects at a distance adequate to making signals of various kinds. I never myself attempted to reduce these principles to practice, or to apply any of my discoveries to processes in

the arts. My whole attention, exclusive of my duties to the college, was devoted to original scientific investigations, and I left to others what I considered in a scientific view of subordinate importance—the application of my discoveries to useful purposes in the arts. Besides this, I partook of the feeling common to men of science, which disinclines them to secure to themselves the advantages of their discoveries by a patent.

In February, 1837, I went to Europe; and early in April of that year Prof. Wheatstone, of London, in the course of a visit to him at King's College, London, with Prof. Bache, now of the Coast Survey, explained to us his plans of an electro-magnetic telegraph; and, among other things, exhibited to us his method of bringing into action a second galvanic circuit. This consisted in closing the second circuit by the deflection of a needle, so placed that the two ends projecting upwards, *of* the open circuit would be united by the contact of the end of the needle when deflected, and on opening or breaking of the circuit so closed by opening the first circuit, and thus interrupting the current, when the needle would resume its ordinary position under the influence of the magnetism of the earth. I informed him that I had devised another method of producing effects somewhat similar. This consisted in opening the circuit of my large quantity magnet at Princeton, when loaded with many hundred pounds weight, by attracting upward a small piece of moveable wire, with a small intensity magnet, connected with a long wire circuit. When the circuit of the large battery was thus broken by an action from a distance, the weights would fall, and great mechanical effect could thus be produced, such as the ringing of church bells at the distance of a hundred miles or more, an illustration which I had previously given to my class at Princeton. My impression is strong, that I had explained the precise process to my class before I went to Europe, but testifying now without the opportunity of reference to my notes, I cannot speak positively. I am, however, certain of having mentioned in my lectures every year previously, at Princeton, the project of ringing bells at a distance by the use of the electro-magnet, and of having frequently illustrated the principle to my class, by causing in some cases a thousand pounds to fall on the floor, by merely lifting a piece of wire from two cups of mercury closing the circuit.

The object of Prof. Wheatstone, as I understood it, in bringing into action a second circuit, was to provide a remedy for the diminution of force in a long circuit. My object, in the process described by me, was to bring into operation a large quantity magnet, connected with a quantity battery in a local circuit, by means of a small intensity magnet and an intensity battery at a distance.

The only other scientific facts of importance to the practical operation of the telegraph not already mentioned, are the discovery by Steinhiel, in 1837, in Germany, of the practicability of completing a galvanic circuit, by using the earth for completing the circuit, and the construction of the constant battery in 1836, or about that time, by

Prof. Danielle, of King's college, London. I believe that I was the first to repeat the experiments of Steinheil and Danielle in this country. I stretched a wire from my study to my laboratory, through a distance in the air of several hundred yards, and used the earth as a return conductor, with a very minute battery, the negative element of which was a common pin, such as is used in dress, and the positive element the point of a zinc wire immersed in a single drop of acid. With this arrangement, a needle was deflected in my laboratory before my class. I afterwards transmitted currents in various directions through the college grounds at Princeton. The exact date of these experiments I am unable to give without reference to my notes. They were previous, however, to the unsuccessful attempt of Mr. Morse to transmit currents of electricity through wires buried in the earth between Washington and Baltimore, and before he attempted to use the earth as a part of the circuit. Previous to this time, and after the above mentioned experiments, Mr. Morse visited me at Princeton, to consult me on the arrangement of his conductors. During this visit we conversed freely on the subject of insulation and conduction of wires. I urged him to put his wires on poles, and stated to him my experiments and their results.

In the course of the years 1836 and 1837, various plans of more or less merit were devised, and more or less fully carried into effect, for applying the principles already discovered to the construction of electromagnetic telegraphs in different parts of the world, but of these I do not undertake to give any particular account. I would say, however, that of these plans that for which Mr. Morse subsequently obtained a patent was, in my judgment, the best.

3. Please state whether or not you are acquainted with the Electromagnetic Telegraph for which S. F. B. Morse obtained a patent in 1846? If you are, please state whether any, and if any, which of the principles or plans which you have described as discovered, or announced by yourself or others, and used in the construction or operation of it. State also what principles used in the telegraph are, so far as you know, original with Prof. Morse.

Answer. I am acquainted with the principles and general mode of operation of the telegraph and improvement referred to. The telegraph is based upon the facts discovered by myself and others, of which I have already given an account. The plan which was first described to me in the autumn of 1837 by Mr. Morse, or by Professor Gale, who was associated with him in the construction of the telegraph, was to employ a single entire circuit of wire, with an intensity battery to excite the current, and an intensity magnet to receive it and produce a mechanical action, which would work the recording apparatus. Mr. Morse afterwards employed the intensity battery in a long circuit, and an intensity magnet to receive its current at a distant point, and produce the mechanical effect of closing a secondary circuit. The secondary circuit may be either employed to transmit a second current to a distant point and there close a third circuit, and thus continued the line, or for working a re-

cording apparatus in the secondary circuit, or it may be employed without reference to the continuation of the line, as a short local circuit to work a local magnet. In the first case, there must be in the secondary circuit an intensity battery and intensity magnet; in the last case, a quantity magnet and quantity battery are required. I heard nothing of the secondary circuit as a part of Mr. Morse's plan until after his return from Europe, whither he went in 1838. It was not till long after this that Mr. Morse used the earth as a part of the circuit in accordance with the discovery of Stienhiel.

I am not aware that Mr. Morse ever made a single original discovery in electricity, magnetism, or electro-magnetism, applicable to the invention of the telegraph. I have always considered his merit to consist in combining and applying the discoveries of others in the invention of a particular instrument and process for telegraphic purposes. I have no means of determining how far this invention is original with himself, or how much is due to those associated with him.

4. Please state when you first became acquainted with Mr. Morse, and what knowledge he possessed of electricity, magnetism, and electro-magnetism, and what information you or others communicated to him relating to the telegraph. State, also, all you know of the attempts of himself, and others associated with him, to construct an electro-magnetic telegraph, either from your own observation or from statements made by himself or by others in your presence. State particularly any conversation, if any, you may have had with him in reference to your own discoveries applied to the telegraph.

Answer. Shortly after my return from Europe in the autumn of 1837, I learned that Mr. Morse was about to petition Congress for assistance in constructing the electro-magnetic telegraph. Some of my friends in Princeton, knowing what I had done in developing the principles of the telegraph, urged me to make the representation to Congress which I expressed some thought of doing, namely, that the principles of the electro-magnetic telegraph belonged to the science of the world, and that any appropriation which might be made by Congress should be a premium for the best plan, and the means of testing the same, which the ingenuity of the country might offer. Shortly after this I visited New York, and there accidentally made the personal acquaintance of Mr. Morse; he appeared to be an unassuming and prepossessing gentleman, with very little knowledge of the general principles of electricity, magnetism, or electro-magnetism. He made no claims in conversation with me to any scientific discovery, or to any thing beyond his particular machine and process of applying known principles to telegraphic purposes. He explained to me his plan of a telegraph with which he had recently made a successful experiment; I thought this plan better than any with which I had been made acquainted in Europe; I became interested in him, and instead of interfering in his application to Congress, I gave him a certificate, in the form of a letter, stating my confidence in the practicability of the electro-magnetic

telegraph, and my belief that the form proposed by himself was the best which had been published.

Mr. Morse subsequently visited Princeton several times to confer with me on the principles of electricity and magnetism which might be applicable to the telegraph. I freely gave him any information I possessed.

I learned in 1837, or thereabouts, that Prof. Gale and Dr. Fisher were the scientific assistants of Mr. Morse in preparing the telegraph. Mr. Vail was also employed, but I know not in what capacity, and I am not personally acquainted with him. With Professor Gale I have been intimately acquainted for several years; he had been a pupil in chemistry of my friend Dr. Torrey, and had studied my papers on electro-magnetism, and, as he informed me, had applied them in the arrangement of the apparatus for the construction of Morse's telegraph.

My researches had been given to the world several years before the attempt was made to reduce the magnetic telegraph to practice. Mr. Chilton, of New York, informed me that he had referred Mr. Morse to them previous to his experiments in the New York University. I was, therefore, much surprised on the publication, in 1845, of a work purporting to give a history of the telegraph and of the principles on which it was founded, by Mr. Vail, then principal assistant of Mr. Morse, and one of the proprietors of his patent, to find all my published researches relating to the telegraph passed over with little more than the remark, that Dr. Moll and myself had made large electro-magnetic magnets. Presuming that this publication was authorized by Mr. Morse and the proprietors of the telegraph, I complained to some of his friends of the injustice, and after his return from Europe, (for he was absent at the time the book was issued,) I received a letter, copied and signed by Mr. Vail, but written by Mr. Morse, as the latter afterwards informed me, excusing the publication, on the ground that he (Mr. Vail) was ignorant of what I had done, and asking me for an account of my researches. This letter was addressed to me after the book had been stereotyped and widely circulated. It has been translated into French, and, I believe, published in Paris. To the letter I did not think fit to make any reply. I afterwards received a letter from Mr. Morse in his own name, on the same subject, to which I gave a verbal reply in January, 1847, in Washington. In this interview Mr. Morse acknowledged that injustice had been done me, but said that proper reparation would be made. Another issue of the same work was made, bearing date 1847, in which there is no change in the statement relative to my researches.

About the beginning of 1848 Mr. Walker, of the Coast Survey, in a report on the application of the telegraph to the determination of differences of longitude, alluded to my researches. A copy of this was sent to Mr. Morse, which led to an interview between Mr. Walker, Professor Gale, Mr. Morse, and myself. At this meeting, which took place at my office in Washington, Mr. Morse stated that he had not known

until reading my paper in January, 1847, that I had two years before his first conception in 1832, settled the point of practicability of the telegraph, and shown how mechanical effects could be produced at a distance, both in the deflection of a needle and in the action of an electro-magnet; that he did not know, at the time of his experiments in 1837, that there had been any doubts of the action of a current at a distance, and that in the confidence of the persuasion that the effect could be produced, he had devised the proper apparatus by which his telegraph was put in operation. Prof. Gale being then referred to, stated that Mr. Morse had forgotten the precise state of the case; that he, (Mr. Morse,) previous to his, (Dr. Gale's,) connexion with him, had not succeeded in producing effects at a distance; that when he was first called in he found Mr. Morse attempting to make an electro-magnet act through a circuit of a few yards of copper wire suspended around a room in the University of New York, and that he could not succeed in producing the desired effect even in *this* that circuit; that he, (Dr. Gale,) asked him if he had studied Prof. Henry's paper on the subject, and that the answer was "no;" that he then informed Mr. Morse that he would find the principles necessary to success explained in that paper; that instead of the battery of a single element, he should employ one of a number of pairs; and that, in place of the magnet with a short single wire, he should use one with a long coil. Dr. Gale further stated that his apparatus was in the same building, and that having articles of the kind he had mentioned, he procured them, and that with these the action was produced through a circuit of half a mile wire. To this statement Mr. Morse made no reply. The interview then terminated, and I have since had no further communication with him on the subject.

5. Please state whether or not you ever constructed any machine for producing motion by magnetic attraction and repulsion; if yea, what was it, and what led to the making of it?

Answer. After developing the great magnetic power of the electro-magnet as already described, the thought occurred to me that this power might be applied to give motion to a machine. The simplest arrangement which suggested itself to my mind was one already referred to, namely, causing a moveable bar, supported on a horizontal axis like a scale beam, to be attracted and repelled by two permanent magnets. This could be readily effected by transmitting, through a coil of wire around the suspended bar, a current of galvanism, first in one direction, and then in the opposite direction, the alternations of the current being produced by dipping the ends of wires projecting from the coil into cups of mercury connected with batteries, one on either side. An account of this was published in Silliman's Journal for 1831, vol. 20, page 340. It was the first successful attempt to produce a mechanical motion which might apparently be employed in the arts as a motive power. This little machine attracted much attention at home and abroad, and various modifications of it were made by myself and others. I never, however, regarded it as practically applicable in the arts, because of the

great expense of producing power by this means; except, perhaps, in particular cases where expense of power is of little consequence.

6. Please look at the drawings of the Columbian telegraph, now shown you, marked G. W. B. and N. B. C, and certified by G. S. Hillard, commissioner. Describe generally the apparatus represented and its mode of operation, and state in what respects, if any, it differs from the telegraphic apparatus patented by Mr. Morse.

Answer. I have looked at the drawings, and I find, on examination, that it will be impossible for me to give a definite answer to the question unless I have more time than is now at my disposal, and the means of examining and comparing the operations of the machines.

7. Please state, if you can, how many original experiments you have made in the course of your investigations in electricity, magnetism, and electro-magnetism.

Answer. The experiments I have mentioned in this deposition form but a small part of my original investigations. Besides many that I made in Albany, which I have not mentioned since my removal to Princeton, I have made several thousand on electricity, magnetism, and electro-magnetism, particularly the former, which have more or less bearing on practical applications of this branch of science, brief minutes of which fill several hundred folio pages. Many of these have not been published in detail. They have cost me years of labor and much expense.

The only reward I ever expected was the consciousness of advancing science, the pleasure of discovering new truths, and the scientific reputation to which these labors would entitle me.

JOSEPH HENRY.

Sworn to before me, September 7th, 1849.

GEO. S. HILLARD,
Commissioner.

UNITED STATES OF AMERICA,
District of Massachusetts, ss.
City of Boston.

On the several dates *are* hereinbefore stated, personally appeared before me, the subscriber, a commissioner duly appointed to take depositions in the courts of the United States, the deponents, Charles T. Jackson, Geo. W. Benedict, N. B. Chamberlain, J. H. Abbott, B. A. Gould, jr., Joseph Tracy, Cyrus Alger, Francis Alger, Horatio Bigelow, and Joseph Henry, whose names are above written; and being by me severally and carefully examined, cautioned, and sworn, (except Joseph H. Abbott, who was duly affirmed,) to tell the truth, the whole truth, and nothing but the truth, they severally gave and subscribed the foregoing depositions and testimony, and made oath to the same, except J. H. Abbott as aforesaid, the same having been reduced to writing by me. The above depositions are taken, to be used in a civil cause now depending in the circuit court of the United States for the district of Kentucky, wherein S. F. B. Morse et al. are plain-

tiffs, and H. O'Rielly et al. are defendants, and were taken at the request of the defendants. The testimony of the said deponents is necessary in the said cause, and the cause of the taking thereof is, that the said deponents live at a greater distance from the place of trial than one hundred miles, and out of the said district of Kentucky. The said Joseph Henry was also about to depart on a journey beyond the limits of the United States. I am not of counsel or attorney to either of the parties, nor interested in the result of the said cause. No notification to the adverse party was first made out and served upon them, or any attorney of theirs, because neither are within one hundred miles of the place of this caption. And the said depositions have been retained in my hands until sealed up and directed to the said court.

GEO. S. HILLARD,
Commissioner.

UNITED STATES OF AMERICA,
Massachusetts district, ss.

I, Isaac O. Barnes, clerk of the circuit court of the United States for the first circuit, Massachusetts district, do hereby certify, that I am acquainted with the handwriting of George S. Hillard, esq., whose name is subscribed to the annexed depositions, and that the said signature of George S. Hillard is his handwriting. And I do further certify, that the said George S. Hillard, esq., was, at the time of writing the same, a commissioner duly appointed by the said court, pursuant to the acts of Congress, in cases made and provided, "for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States."

In testimony whereof I have hereto subscribed my name, and affixed the seal of the said court, this fifteenth day of September, in the year of our Lord one thousand eight hundred and forty-nine, and in the seventy-fourth year of the independence of the United States of America.

[L. S.]

ISAAC O. BARNES, *Clerk.*

Deposition of J. Renwick.

UNITED STATES OF AMERICA,
Southern district of New York, ss.,
City and county of New York.

Be it remembered, that, on this 13th day of September, in the year of our Lord one thousand eight hundred and forty-nine, I, John W. Wilson, a commissioner duly appointed by the circuit court of the United States, for the southern district of New York, in the second circuit, under and by virtue of the act of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed Feb. 20th, 1812, and the act of Congress entitled "An act in addition to an act for the more convenient taking of affidavits and bail in civil causes, depending

in the courts of the United States," passed March 1st, 1817; and the act entitled "An act to establish the judicial courts of the United States," passed Sept. 24th, 1789, did call and cause to be, and personally appear before me, at my office, No. 61, Wall street, in the city of New York, in the said southern district of New York, in the State of New York, James Renwick, James R. Chilton, and Charles F. Durant, to testify and the truth to say, on the part and behalf of the defendants, in a certain suit or matter of controversy now depending and undetermined in the circuit court of the United States for the district of Kentucky, wherein Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith are plaintiffs, and Henry O'Rielly, Eugene L. Witman, et al. are defendants. And the said witnesses, being of lawful age, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said witnesses, and *he* did thereupon depose, testify, and say as follows, viz.:

Q. Please state your age, residence, and occupation.

A. I am fifty-seven years of age; am professor of natural and experimental philosophy and chemistry in Columbia college, N. York, where I reside.

Q. Please state whether you have already testified in any suit or suits of S. F. B. Morse and others against Henry O'Rielly and others; if so, in whose behalf.

A. I have so testified on behalf of Professor Morse and his associates.

Q. Please look at the drawing of the Columbian Telegraph now shown you, and marked "G. A. B." and "N. B. C," and identified by G. S. Hillard, commissioner, and describe briefly its principles and mode of operation?

A. I perceive in the drawing referred to the representation of a galvanic battery, within whose circuit is what I infer to be a bar of soft iron, marked 2.2, which appears to be suspended on pivots; no coil is represented in that part of the drawing, but I presume it is intended that that bar should be surrounded by a coil of wire forming a part of the circuit of the before mentioned battery. On more close examination I perceive the covers of two coils represented, within which coils the two arms of the bar, marked 2.2, appear to enter. I also perceive a key by which the circuit of the said battery may be opened and closed, and I infer that when the circuit is closed the action of the galvanic electricity in the coils will render the bar, 2.2, magnetic, having opposite polarities at its two extremities. I also perceive what I presume to be the representation of a horse-shoe permanent magnet, marked figure 1, which if properly placed will attract the bar, 2.2, so long as the circuit is closed and the electricity is passing through the coils; this will cause the said bar to move towards the left of the drawing. I also perceive the representation of a spring, marked 7, by which, when the circuit is open and the bar, 2.2, loses its temporary magnetism, the said bar will be drawn to the right; this apparatus I understand is called the mutator. I perceive that three wires proceed from the mutator; one of which pro-

ceeds to an apparatus which appears to be composed of permanent and temporary magnets; the other two proceed each to a galvanic battery, which galvanic batteries are connected by a conductor, whence an arm appears to proceed to the apparatus composed of *of* magnets called the register. I infer, therefore, that there are two separate electrical circuits governed by the motion of the bar, 2.2, in such manner that the electricity may be alternately passed in opposite directions through what I infer to be a coil, marked 7, in the drawing of the register; within this coil I *I* perceive what I presume to be the representation of a bar of soft iron, marked 6, which will be rendered magnetic by the passage of the electricity through the coil. and whose poles will be reversed as the direction of the electrical current through the coil is changed by the motion of the bar, 2.2, in the mutator. I also perceive what I infer to be the representation of two permanent horse-shoe magnets, marked 1 and 2, and I see that in a proper position of their respective poles, the bar 6 will be alternately attracted and repelled by these magnets according to the position of its poles. I infer, therefore, that the bar, 6, is intended to be moveable in some mode which is not visible in the drawing; connected with the bar I perceive an arm, marked 8, at the extremity of which I perceive what I suppose to be the representation of a pen, opposite to which I perceive the representation of a strip of paper appearing to move between rollers, and I infer that by the motion of the bar 6 the pen may be alternately pressed against and withdrawn from the strip of paper, and thus draw a broken line upon the paper.

Q. Please state whether in your deposition already given you have expressed the opinion that this telegraph and Morse's are similar and identical; if so, state your reasons for that opinion.

A. I have not stated that they are identical, but have pointed out certain points of similarity and certain differences; the main points of similarity are, first, that the power employed in the two instruments is the same, namely, magnetism developed in bars of soft iron by an electrical current; and, second, in the character of the signals, which are portions of different lengths of a broken line, traced by the throwing forward and withdrawal of a pen or point upon a strip of paper moving uniformly; the differences, so far as I recollect, are that the temporary magnets in Morse's instrument are fixed, and those of the Columbian are moveable. The local circuit is therefore opened and closed in Morse's instrument by the motion of a bar of soft iron alternately attracted by the fixed temporary magnet, and withdrawn from it by a spring, and the pen is passed forward and withdrawn by a similar arrangement. In the Columbian these two duties are performed by the motion of the temporary magnets themselves; in the mutator of the Columbian this motion is aided by the presence of a permanent magnet. In the register of the Columbian the motion is caused by the alternate passage of the electric current in opposite directions, and is aided by the presence of two permanent magnets; in the drawing which was exhibited to me when my former deposition was taken, the permanent magnet, which was represented as

a part of the mutator, had not the form of a horse-shoe, and the manner in which the bar of soft iron was represented corresponded to that difference of form; so that the alternate motion was as certain to be produced by the arrangement represented in that drawing as in the one now before me. A further difference I noted, in the fact that the temporary magnet in the register of the Columbian has its poles reversed by the alternate passage of the electric current in opposite directions, while in Morse's the motion of the pen-holder is produced by opening and closing a single circuit; thus taking away and giving temporary magnetism to his register magnet.

Q. If the galvanic current in the main circuit sent through the coils of the mutator temporarily magnetizes the arms of the bar 2.2, with polarities similar to those of the permanent magnet, and so neutralizes the attraction of that magnet so far that the spring will overcome its force and withdraw the bar. And if, when the current is arrested by opening the circuit, and the temporary magnetism caused in the bar, the permanent magnet overcomes the force of the spring and draws the bar in the opposite direction, by what powers or forces would you say that the instrument is worked? Please explain the ground of your opinion.

A. Admitting the hypothesis, I should consider that the force to which the motion is owing is the electro-magnetic force; for if it had not acted in the first place, the bar of soft iron must have remained forever in contact with the permanent magnet. I should compare the action of the permanent magnet and the spring to that of the balance and hair spring of a watch, which regulate and control the prime mover, but do not themselves cause any motion.

Q. If by the introduction of permanent magnets, as in the Columbian telegraph, the instrument can be operated with a considerably less amount of battery power than is necessary to operate Morse's, would or would not that circumstance, in your opinion, constitute an essential distinction between the two telegraphs; if not, why not?

A. I should not consider that a mere difference of the amount of power required would make an essential difference between any two instruments intended to fulfil the same object; the reason can be best given by an illustration; a small pocket watch and a large chronometer fulfil the same object by means of prime movers of the same description, namely, a steel spring in each; there is no essential difference growing out of the different strength of the two springs; the two instruments are notwithstanding different; but the difference does not lie either in the prime mover or the nature of the work performed.

Q. Would you then say that if the first inventor of a time piece moved primarily by a spring had obtained a patent, no person could *could* make or use, without infringement during the existence of the patent, a watch moved by a spring, but through an essentially different combination of machinery, the right to use the motive power of the spring to obtain mechanical results being common to all?

A. I would not, but I think the specification of the first watch might

have been so drawn that none of those which have been since invented could have been used without infringing that patent; but to have drawn such a specification might have required to have foreseen some at least of the improvements that have since been made.

Q. If by the introduction of the permanent magnets an arrangement is effected in the Columbian telegraph whereby the instrument is rendered less susceptible to the disturbing effects of atmospheric electricity, so that it can be worked in states of the atmosphere where Morse's instrument cannot be worked, would or would not that circumstance in your opinion constitute an essential distinction between the two telegraphs, provided that the right to use the galvanic current for making marks as signs of ideas at a distance, be common to the inventions of both instruments?

A. Admitting the hypothesis I should consider the use of the permanent magnets for that specific object as an essential difference in the two instruments, and as susceptible of being patented as an improvement.

Q. Please give a succinct account of the principal discoveries and inventions in electro-magnetism bearing on the construction of telegraphs.

A. The fact that a galvanized wire will attract iron was first made public about 1817, by Sir Humphrey Davey. In 1819 Oersted discovered that if the galvanized wire were placed in the meridian it would cause the needle of a compass to diverge; the fact was published in 1820, and was immediately taken up by Ampere, who proposed an hypothesis to account for the phenomenon, and in explaining it, first made use of the term electric currents. Ampere in his experiments discovered that a helix of wire whose axis was a straight line would arrange itself in the direction of the meridian; that a steel bar placed within such a helix might be rendered permanently magnetic, and a bar of soft iron powerfully magnetized, so long as electricity was passing through the wire; the use of temporary magnets thus made of bars of soft iron seems to have been propagated by the makers of philosophical instruments; among the rest by Sturgeon, of London, and nearly all the apparatus intended for illustrating electro-magnetism by experiment were in use as early as 1824. I had them in the apparatus of Columbia college in 1827, if not before; the influence of an increased number of convolutions of the coils is chiefly due to the investigations of Faraday and Henry, which began as far as I recollect about 1830, and can hardly be said to be entirely exhausted at the present day. I do not now recollect any further discoveries which bear directly upon either of the two telegraphs.

Q. Please state what you have said in your deposition already as to the knowledge possessed by Professor Morse of electricity, magnetism, and electro-magnetism, prior to 1838. If you have expressed the opinion that he was acquainted with those sciences, state what reasons you gave for it.

A. I have stated in that deposition that at a date prior to his second visit to Europe Professor Morse in particular asked me a question in

relation to the velocity of electricity, and the practicability of conveying it to a great distance; that I inferred from the question and accompanying conversation that Professor Morse had a telegraph in view. This visit of Professor Morse to Europe was about 1830. I have also stated that Professor Morse satisfied me that he had attended a course of lectures delivered by Professor Dana in the chapel of Columbia college, at which I also was present, and that one of these lectures was devoted to the subject of electro-magnetism. These lectures were delivered in the winter of 1826–'7. I also stated that I knew that Mr. Morse was fond of studying scientific subjects from being in the habit of meeting him once a week for eight months in each year, except while he was absent in Europe, for ten or twelve successive years. I have also stated that after Mr. Morse's third visit to Europe, whither he went on that occasion to procure patents, I sought from him, at his return, the latest intelligence in relation to electricity and magnetism, and particularly in relation to a form of galvanic battery invented by Dangell. This last visit to Europe was about the date of his first American patent, about 1835. The occasions of my meeting Mr. Morse were two clubs; the first of which was called the "Lunch," of unlimited numbers, meeting at a public house; the second, which succeeded it, composed of twelve persons, who went to each other's houses. The conversation in which Mr. Morse asked the question in relation to electricity occurred at one of the meetings of the "Lunch," which I have stated was the earliest in point of time. Fennimore Cooper was the founder of the Lunch, and was not a member of the succeeding club. I have also stated that I became acquainted with Mr. Morse in London, in 1816. I was twice in London during that year, and once I spent more than two months in that city in 1815. It is possible, therefore, that my acquaintance with Mr. Morse may date from 1815.

JAS. RENWICK.

Sworn before me, the 13th September, 1849.

J. W. WILSON, *U. S. Com'r.*

Deposition of J. R. Chilton.

Q. Please state your age, residence, and occupation.

A. My age is forty years; reside in the city of N. York; am by profession a practical chemist and doctor of medicine.

Q. Please state whether or not you have ever made any electro-magnets; if so, for what purpose, and when; to whom, if to any person, was it explained; on whose plan was it made, and what statement, if any, did you make to the persons to whom you exhibited.

A. I have made many electro-magnets. The first were in the winter of 1827 to 1828, on the plan of Sturgeon, from one which Professor Dana had originally loaned me, and which was afterwards purchased by my father. This magnet had been used by Professor Dana

in his lectures early in 1827. He died in April of that year. I afterwards made, in 1834 and 1835, several large magnets on the plan of Professor Henry, published in the American Journal of Science for 1831; particularly one for the West Point Military Academy in 1835. This was exhibited in my store in Broadway, and attracted much attention. Among the gentlemen who came to see it was Professor Samuel F. B. Morse. I was in the habit of explaining its properties to those who came to see it, and uniformly referred them to Professor Henry's publication as the source of information respecting it, and have no doubt that I did so to Professor Morse.

Q. Please state whether you have given testimony in any suit or suits of S. F. B. Morse against Henry O'Rielly and others; if so, when and in whose behalf.

A. I have given testimony in behalf of complainants, to be used in a suit or suits between the parties named, as I suppose. It was on the 11th of this month, I think.

Q. Please look at the drawing of the Columbian Telegraph now shown you, and marked "G. W. B." and "N. B. C.," and identified by G. S. Hillard, commissioner; describe briefly its principle and mode of operations.

A. The mutator represented in the drawing referred to is composed of a permanent magnet and a bent bar of soft iron, passing through two helicale coils of wire, and suspended by an axis, so that it can vibrate back and forth; to it is attached a spring which brings the suspended bar into contact with a metallic point which communicates with one pole of a galvanic battery, completes a circuit in one direction through a coil or helix constituting part of the register; when the key of the main circuit is pressed upon and closed, a communication is established between the battery of the mutator, thus closing the circuit and causing the current to pass through the helicale coils of the mutator, the effect of which forms an electro-magnet of the bent iron bar, and causes it to move in the direction of the permanent magnet, the poles of which are in opposite directions; this effect of the electro-magnet, by touching a metal point, completes a galvanic circuit of the register battery, and by that means an electro-magnet is produced in the register with poles in an opposite direction to what they were when the current passed in the other direction; the electro-magnet of the register moves towards, or other of the permanent magnets depending upon the polarity given it by the galvanic current, by means of a point attached to the moving electro-magnet, characters or marks are imprinted upon a paper made to move before it.

Q. Please state whether, in the deposition already taken, you have expressed the opinion that this telegraph and Mr. Morse's are similar or identical. If so, state what reasons you gave for that opinion.

A. I expressed the opinion that they were essentially upon the same principle. I do not think I expressed the opinion that they were identical in other respects.

The reasons I gave were, that the mutator performs the office of the

receiving magnet by the agency of an electro-magnet, and that a piece of soft iron placed in the situation of the permanent magnet, in connection with the use of a spring, would effect the same object, and that in the register there is no advantage in using the permanent magnet, as the same end would be effected by having the electro-magnet fixed, and having a piece of soft iron in place of one of the permanent magnets, and a spring in place of the other.

Q. If by the introduction of the permanent magnets, as in the Columbian Telegraph, the instrument can be operated with a considerably less amount of battery power than is necessary to operate Morse's under the most favorable conditions, would that circumstance affect your opinion as to the identity of principle between the two telegraphs; if not, why not?

A. It would not; because, although one might be worked with less power, and by a different mechanical arrangement from the other, still electro-magnetism is essential to work either; and if more power is necessary, it is much easier to obtain it by increasing the battery than by complicating the mechanism.

Q. If by the introduction of the permanent magnet an arrangement is effected in the Columbian Telegraph, whereby the instrument is made less susceptible to the disturbing effects of atmospheric electricity, so that it can be worked in states of the atmosphere when Morse's instrument cannot be worked, would that circumstance affect your opinion as to the identity of the two instruments?

A. If Mr. Morse is entitled to the exclusive right of using electro-magnetism for imprinting marks or signs of ideas at a distance, then any instrument in which electro-magnetism is employed, as it is in the Columbian for that purpose, whether for better or worse, must be identical in principle with his; but if he is not entitled to that exclusive right, and by the arrangement of the Columbian Telegraph an instrument is obtained which can be worked in electrical states of the atmosphere when his cannot be worked, (of which fact, however, I am unaware,) then I should say the combination was a distinct instrument from his. I have already said in my former deposition that its mechanical arrangement is different. I have never seen the Columbian instrument in operation.

Q. Please state what electro-magnet Professor Dana used, if any, in the lectures referred to, delivered early in 1827, and what became of it.

A. The electro-magnet was one constructed on the plan of Sturgeon. After Professor Dana's death my father purchased all his apparatus, and subsequently sold the same, including the electro-magnet, to Doctor Torry, who succeeded Professor Dana. About two years ago, I think, I mentioned to Professor Morse that it was probably in Dr. Torry's possession, from whom Mr. Morse subsequently obtained it. Sturgeon's magnet was a very simple instrument, and easily constructed by any one who had read an account of it; it consisted simply of a bent bar of soft iron, with a piece of copper wire wound several times around with considerable intervals between the turns, so as not

[to] touch; the extremities of the wire being attached to the two poles of a galvanic battery, made it an electro-magnet.

JAMES R. CHILTON.

Sworn before me, Sept. 13th, 1849.

J. W. WILSON, *U. S. Com.*

Deposition of C. F. Durant.

(Deposition of C. F. Durant, to wit:)

Please refer to the paper now shown you, and marked A, and identified by the signature of the commissioner taking this deposition, and state if you know when it was written, by whom, and on what occasion; whether it has been published; and if so, when.

A. I wrote the article marked A in the year 1837, near its close, at the special request of the superintending agent and corresponding secretary of the American Institute, A. W. F. B. Waterman, as a report and faithful description of Professor Morse's Electro-magnetic Telegraph. The length of wire and other matters, not obvious upon inspection, I gave on the authority of Mr. Vail, the gentleman in charge, who exhibited the apparatus to me at the New York University, in the city of N. York. Mr. Morse took no part in exhibiting the telegraph to me.

Q. Please state what conversation you had with Alfred Vail, Samuel F. B. Morse, and F. O. J. Smith, or either of them, in reference to this article.

A. Several months after the publication of the report marked A in the journal of the American Institute, I had a conversation with Mr. Alfred Vail on the subject. He informed me that Professor Morse had read the report, over the signature of "D," in the journal of the Am. Institute, (the document marked A;) and that the said Professor Morse expressed himself much pleased with it. He also said that Professor Morse, on reading said report, remarked, "that it was very accurate, and the best description he had yet seen published;" and further, *the* "he only regretted it appeared so soon, as he had not yet secured his caveat in France or England.

Q. Please state what has been said, if any thing, by Alfred Vail, Samuel F. B. Morse, or F. O. J. Smith, in reference to a second or local circuit to you, or in your presence; also, when, if any time, in any place, or trial of the telegraph, the second or local circuit was introduced.

A. Not one word in reference to a second or local circuit was ever stated to me, or in my hearing, by either of those gentlemen, until about the year 1845, when, I believe, Mr. Alfred Vail mentioned a local circuit in a brief conversation we then had.

Q. Please state whether you are acquainted with principles and modes of operation of telegraphs employing electro-magnetism, and particularly with those of Morse's telegraphs, so called; if you are, please look at the drawings of the Columbian Telegraph marked *marked* "G. W.

B." and "N. B. C.," and identified by G. S. Hillard, commissioner, and state whether or not that telegraph differs from Morse's; and if so, in what respect.

A. I have a general acquaintance with electro-magnetic telegraphs. All employ electro-magnetism as an active agent, and derive their name from that circumstance. I paid particular attention to Morse's telegraph before it was patented in 1840, and have seen it in operation since it was patented; it is quite different now from what it was when I first became acquainted with it, in the arrangement and combination of the machinery. I have examined the drawings of the Columbian Telegraph referred to; in the arrangement and combination of machinery it is entirely different from Morse's; both, however, employ electro-magnetism; and if Mr. Morse has a legal right to the exclusive use of electro-magnetism in every application for the purpose of telegraphic communication by impressions or indentations, then I think the use of the Columbian Telegraph would be an infringement of that right; but if Mr. Morse has only a right to his particular machine and mode of producing results, then I think the use of the Columbian machine would not be an infringement of that right, for I regard it as distinct in its mode of operation, by the combined forces of electro-magnetism and permanent magnetism, and a spring in the mutator, and of electro-magnetism and permanent magnetism in the register, as well as in the arrangement and combination of machinery. Permanent magnetism and electro-magnetism are totally distinct things in their nature and operation. Electro-magnetism is the great principle on which both the Columbian and Morse instruments depend, precisely as all such machines as clocks, water-mills, &c., depend on the great principle of gravitation. The principles of mechanical combinations in the two instruments are dissimilar, precisely as two water-mills or two clocks, producing their results by machinery, combined and arranged upon distinct principles of working would be dissimilar.

C. F. DURANT.

Sworn before me, the 13th Sept., 1849.

J. W. WILSON, *U. S. Comr.*

Exhibit A of Durant's deposition.

The following is the paper A, made part of the foregoing deposition of C. F. Durant:

From the journal of the (New York) American Institute, Feb., 1838, vol. 3, No. 5, pp. 259–'60.

Electro-magnetic telegraph, by a member, read at the stated meeting of the Institute.

To the CORRESPONDING SECRETARY, &c.

In compliance with your request I herewith send you a brief description of the electro-magnetic telegraph of Professor Morse, who has

[to] touch; the extremities of the wire being attached to the two poles of a galvanic battery, made it an electro-magnet.

JAMES R. CHILTON.

Sworn before me, Sept. 13th, 1849.

J. W. WILSON, *U. S. Com.*

Deposition of C. F. Durant.

(Deposition of C. F. Durant, to wit:)

Please refer to the paper now shown you, and marked A, and identified by the signature of the commissioner taking this deposition, and state if you know when it was written, by whom, and on what occasion; whether it has been published; and if so, when.

A. I wrote the article marked A in the year 1837, near its close, at the special request of the superintending agent and corresponding secretary of the American Institute, A. W. F. B. Waterman, as a report and faithful description of Professor Morse's Electro-magnetic Telegraph. The length of wire and other matters, not obvious upon inspection, I gave on the authority of Mr. Vail, the gentleman in charge, who exhibited the apparatus to me at the New York University, in the city of N. York. Mr. Morse took no part in exhibiting the telegraph to me.

Q. Please state what conversation you had with Alfred Vail, Samuel F. B. Morse, and F. O. J. Smith, or either of them, in reference to this article.

A. Several months after the publication of the report marked A in the journal of the American Institute, I had a conversation with Mr. Alfred Vail on the subject. He informed me that Professor Morse had read the report, over the signature of "D," in the journal of the Am. Institute, (the document marked A;) and that the said Professor Morse expressed himself much pleased with it. He also said that Professor Morse, on reading said report, remarked, "that it was very accurate, and the best description he had yet seen published;" and further, *the* "he only regretted it appeared so soon, as he had not yet secured his caveat in France or England.

Q. Please state what has been said, if any thing, by Alfred Vail, Samuel F. B. Morse, or F. O. J. Smith, in reference to a second or local circuit to you, or in your presence; also, when, if any time, in any place, or trial of the telegraph, the second or local circuit was introduced.

A. Not one word in reference to a second or local circuit was ever stated to me, or in my hearing, by either of those gentlemen, until about the year 1845, when, I believe, Mr. Alfred Vail mentioned a local circuit in a brief conversation we then had.

Q. Please state whether you are acquainted with principles and modes of operation of telegraphs employing electro-magnetism, and particularly with those of Morse's telegraphs, so called; if you are, please look at the drawings of the Columbian Telegraph marked *marked* "G. W.

B." and "N. B. C.," and identified by G. S. Hillard, commissioner, and state whether or not that telegraph differs from Morse's; and if so, in what respect.

A. I have a general acquaintance with electro-magnetic telegraphs. All employ electro-magnetism as an active agent, and derive their name from that circumstance. I paid particular attention to Morse's telegraph before it was patented in 1840, and have seen it in operation since it was patented; it is quite different now from what it was when I first became acquainted with it, in the arrangement and combination of the machinery. I have examined the drawings of the Columbian Telegraph referred to; in the arrangement and combination of machinery it is entirely different from Morse's; both, however, employ electro-magnetism; and if Mr. Morse has a legal right to the exclusive use of electro-magnetism in every application for the purpose of telegraphic communication by impressions or indentations, then I think the use of the Columbian Telegraph would be an infringement of that right; but if Mr. Morse has only a right to his particular machine and mode of producing results, then I think the use of the Columbian machine would not be an infringement of that right, for I regard it as distinct in its mode of operation, by the combined forces of electro-magnetism and permanent magnetism, and a spring in the mutator, and of electro-magnetism and permanent magnetism in the register, as well as in the arrangement and combination of machinery. Permanent magnetism and electro-magnetism are totally distinct things in their nature and operation. Electro-magnetism is the great principle on which both the Columbian and Morse instruments depend, precisely as all such machines as clocks, water-mills, &c., depend on the great principle of gravitation. The principles of mechanical combinations in the two instruments are dissimilar, precisely as two water-mills or two clocks, producing their results by machinery, combined and arranged upon distinct principles of working would be dissimilar.

C. F. DURANT.

Sworn before me, the 13th Sept., 1849.

J. W. WILSON, *U. S. Comr.*

Exhibit A of Durant's deposition.

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From the journal of the (New York) American Institute, Feb., 1838, vol. 3, No. 5, pp. 259–'60.

Electro-magnetic telegraph, by a member, read at the stated meeting of the Institute.

To the CORRESPONDING SECRETARY, &c.

In compliance with your request I herewith send you a brief description of the electro-magnetic telegraph of Professor Morse, who has

recently completed an apparatus of sufficient size and perfection to demonstrate in a very plausible manner the practicability of communicating intelligence to any definite distance on the earth by the agency of wire to conduct the galvanic fluid or voltaic electricity, (which, in the opinion of some philosophers, is a modification of light,) and is known to move with the rapidity of light itself. Mr. Morse employs copper wire conductors ten miles long; for convenience, this wire is wound on a reel; to prevent contact, the wire is covered with cotton thread, which being a bad conductor, of course the voltaic electricity follows the wire in its course round the reel during the whole length, (ten miles,) the same as if the wire were extended through the air.

The spark or shock produced at one end, by bringing the two poles of a galvanic battery in contact, is instantly carried by the conducting wire to the other end, where a piece of soft iron in horse-shoe form receives the spark, (galvanic fluid,) and instantly becomes an electro-magnet, which continues its attracting properties only so long as the poles are in contact at the other end. This facility of rendering iron magnetic, and divesting it again of its magnetic properties, constitutes the medium of communicating any word or number of words in the dictionary.

In the foregoing description there is nothing new, so far as regards discovery by Professor Morse; for the idea of an electro-magnetic telegraph has been discussed a long time, and two or more plans for that purpose were some time since patented in England.

The possibility of communicating intelligence by this fluid would naturally have suggested itself to Galvani, its discoverer, or to Volta Carlisle, Nicholson, Cruikshank, Dr. Wollaston, Sir H. Davy, and others, by whom electro-magnetic and electro-chemical science have received their gradual and beautiful development.

The improvement discovered by Professor Morse consists of two very ingenious machines, one at each end of the wire, to communicate the intelligence in the most portable form, and to receive and register it with great expedition and facility. I will describe it thus: first, stations. A dictionary, with a number for every word in the language; types resembling pieces of a saw-blade, having from one to nine teeth, to represent the nine digits; these types are, say, one and three quarter inches from bottom to lower part of the teeth, and one quarter inch more for height of tooth, would make them two inches; also type two inches high, without teeth, and of various breadths, to represent spaces, (the space type are connected with the digit type, but I will treat of them as distinct, in order to explain more clearly their use;) there are also type one and three quarter inches long, and half an inch broad, to represent a cypher. Now suppose the communication to be

Steamboat	Caroline	burned
11345	105	73

the number under each word is there registered in the dictionary. The types are now put in a long groove thus:

For specimen of types, see original.

The first is a tooth or notch, to allow the lever to fall once; then a small space to denote a full character; then notch and space; three notches, space; four notches, space; five notches, and then long space to denote the end of a word. Now, a new word commences with a notch for 1, a small space, then a short type or space for O, then five notches for 5, and so on.

Directly over the groove of types is a lever working on a pivot at the near end, and held up at the end in front of the type by a flat arm or leg, fastened firmly to the lever, and resting on the groove or long space ahead of the type, and as high as the top of the teeth; on the end of the lever next to the arm are two copper points, connected and bent downwards. This machine is connected with a galvanic battery, (Cruikshank's,) and also connected with the ten mile length of wire. The groove containing the types is to move under the lever by a cog-wheel and crank, which is now turned by hand, and the operation commences thus:

The end of the flat arm sinks into the first tooth, which lowers the lever enough to allow the *the* connected copper points on the end to fall into two cups of mercury, which instantly brings in contact the positive and negative poles, and sends a shock or spark to the second station; the types continue to pass under the lever, and when the end of the flat arm is on the top of the teeth, or on spaces of the same height, the copper points must be raised out of the mercury, and the shock or spark ceases; but as often as the flat arm falls into or on a space of same height, (for cypher,) the shock or spark must be continued. I will now leave this to describe the machine and effect produced at the other end of the ten mile wire.

The second station, or place to receive intelligence, has a piece of iron in form of a horse-shoe connected with the great conducting wire; the horse-shoe is horizontal, and in front of it is a cylinder around which is fastened a sheet of paper; this cylinder is made to revolve, and also to move one inch forward at every evolution. Between the cylinder and horse-shoe is a horizontal steel bar; fixed into this bar is a pentagraph, holding a pen or pencil; this bar is also moveable, and the instant the horse-shoe receives the shock or spark from the wire, it becomes an electro-magnet, and attracts the bar to it, while the pen or pencil is by that motion forced against the paper on the cylinder, and again withdrawn as often as the flat arm at first station is raised to the top of the teeth or types.

The first spark which reaches the second station rings a bell, to warn the keeper of the news; the cylinder from that moment receives and continues a motion of equal speed with the groove of types; and at the end of the communication the pen will have made on the paper a register similar to the following:

. . .. — ....

Up to the first large space the dots correspond to 11345, which, in

the dictionary, is the number for steamboat; up to the next large space they make 105, which answers to Caroline; and the remaining dots make 73, which, in the dictionary stand against burned.

☞ This much can be done on the present apparatus of Professor Morse in about six minutes, and it is probable that the same result would ensue, and in the same space of time, if the wire was 500 or 5,000 miles long.

Professor Morse proposes to encase the wire in leaden tubes filled with pitch, and to lay them under ground and on the bed of rivers.

The principal objection to this machine is the probability that water (a second rate conductor) reaching the wire, and attracting all or diminishing the force of the galvanic fluid before it reaches its destination. But it is supposed by a great many good judges, that the galvanic fluid would continue to follow the best conductor, (copper wire,) notwithstanding water should reach it at every mile or foot on the route. If such conclusions be verified by experiment, it will then [be] possible to communicate the account of a shipwreck from Cape Horn, or Terra del Fuego, to New York in less than an hour! So much for the developments of a science discovered by Galvani, merely from seeing the effect produced by two cold metals touching the nerves of a dead frog. D.

UNITED STATES OF AMERICA,
Southern district of New York, ss:

I, John W. Wilson, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress, entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812; and the act of Congress, entitled "An act in addition to an act entitled an act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed March 1st, 1817; and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, do hereby certify, that the reason for taking the foregoing depositions is, and the fact is, that the witnesses reside more than one hundred miles from the place of trial.

I further certify, that, on the 13th day of September, 1849, I was attended by S. P. Chase, of counsel for defendants, and by the witnesses, who were of sound mind and lawful age, and the witnesses having been by me carefully examined, and cautioned, and sworn, to testify the whole truth, the deposition was by me reduced to writing in the presence of the witnesses, who subscribed the same in my presence. I have retained the said deposition in my possession, for the purpose of transmitting the same to the court for which the same were taken.

I further certify, that I am not of counsel or attorney for either of the parties in said deposition and caption named, or in any way interested in the event of the said cause named in the caption.

In testimony whereof I have hereunto set my hand and seal, this
[J. W. W.] 13th day of September, in the year of our Lord one thousand eight hundred and forty-nine.

J. W. WILSON,
United States commissioner.

UNITED STATES OF AMERICA,
Southern district of New York, ss:

I, Alexander Gardiner, clerk of the circuit court of the United States of America, for the southern district of New York, second circuit, do hereby certify, that I am well acquainted with the handwriting of J. W. Wilson, whose name is subscribed to the annexed deposition, and that the signature to the same is in his proper handwriting.

And I do further certify, that he was, at the time of signing the same, a commissioner for the circuit court of the United States of America for the southern district of New York.

In testimony whereof I have hereunto subscribed my name, and affixed the seal of the said circuit court, this 18th day of Sep-
[L. S.] tember, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of these United States the seventy-

ALEX'R GARDINER.

Deposition of Robert Peter.

The deposition of Robert Peter, taken under the interrogatories and cross interrogatories copied herein on page 782, to wit:

The deposition of Robert Peter, M. D., taken before George R. Trotter, judge of the Lexington city court, in the Commonwealth of Kentucky, on the day of May, in the year eighteen hundred and forty-nine, at the office of Madison C. Johnson, esquire, in the city of Lexington, and in the county of Fayette, to be read as evidence in a certain suit depending in the circuit court of the United States, for the eighth circuit, and Kentucky district, holden in Frankfort, wherein Samuel F. B. Morse, &c., are complainants, and Henry O'Rielly, &c., are defendants.

The said deponent being first carefully examined, and cautioned, and sworn to tell the whole truth, doth depose and say, in answer to the interrogatories herewith appended, as follows, to wit:

Answers to interrogatories 1, 2, and 3.

I have made myself acquainted with the principles and mode of operations of the Columbian Telegraph instrument, said to have been invented by Barnes & Zook, of which the annexed drawing, marked (A,) and signed by me, is said to be a copy. It is worked by the attractive and repulsive power alternately exerted between fixed permanent magnets of steel, (the poles of which are marked N and S, in the drawing,) and moveable electro-magnets of soft iron, (marked E. M. in the drawing.)

It differs from Morse's telegraph instrument, in the fact that its motive power is attraction of dissimilar magnetic polarity, and the repulsion of similar magnetic polarity, acting simultaneously between the fixed steel magnets and the moveable electro-magnet, to produce the vibratory motion; while in Morse's instrument this motion is produced by the attraction between a soft iron electro-magnet and its soft iron keeper, an attached spring being employed to draw them apart when the battery current is not passing through the coils of the electro-magnet. The spring thus causes one-half of the vibratory motion of the lever which forms the marks upon the paper constituting the telegraphic signs.

In the Columbian instrument, by changing the magnetic polarity of the moveable electro-magnet, by reversing the direction of the battery current through its coils of wire, the back motion of the marking style is produced in the same manner as the advance motion, viz., by magnetic attraction and repulsion, acting together to produce the same motion; thus doing away with the necessity for the spring which is a constant drawback on the working power of the battery. Moreover, the receiving magnet, (marked 1, in the drawing,) of the Columbian instrument is a pole changer, causing the alternations of the polarity of the register electro-magnet, (marked 2 in the drawing;) while there is no change of polarity employed in the telegraphic instrument of Morse.

The Columbian instrument differs from Morse's in the use of permanent steel magnets, which act by their repulsion as well as by their attraction, on the electro-magnet. If Morse's invention, therefore, is the application of the attractive power of the electro-magnet to telegraphic purposes, the invention of Barnes & Zook is the application of the attraction and repulsion between permanent steel magnets and changeable electro-magnets to the same end; which is a new and different application of the common scientific principles involved, which were the recorded scientific property of the world before either telegraph was invented.

The advantages of the Columbian over Morse's instrument appear to me to be—1st. That it will work with less battery force. 2d. That in consequence of the use of permanent steel magnets its action will be less affected by atmospheric electricity; and consequently it will not be so liable to be thrown out of use, or rendered irregular in its action, by a thunder storm on any part of the line of wires, which, I am informed, frequently interferes with the working of Morse's instrument in some seasons.

The active principle in all forms of electric telegraphs is the same, viz., the wave or current of electricity produced either by the friction of glass, as in the common electrical machine, or by the action of acid or saline solutions on dissimilar metals in the galvanic battery or voltaic pile. It having been clearly demonstrated by scientific research, that the electricity produced by any of these means, or any other known to science, is one and the same principle or agent, differing only in its

relative quantity or intensity, according to the circumstances under which it may have been produced.

It was only in the beginning of the present century that the galvanic or voltaic arrangement for producing a current of electricity was discovered; consequently all attempts to employ electricity for telegraphic purposes, before that period, were confined to the use of electricity, developed by the friction of glass. Several such attempts were proposed and successively made from the middle to the end of the last century, as is stated in all histories of the progress of telegraphing, and particularly in the pamphlet, by Alfred Vail, "on the American telegraph, &c., &c.," published in Philadelphia in 1845.

After the discovery of the galvanic battery, this was found to be the most convenient arrangement for generating electricity for telegraphic purposes, and the electric current produced by this means was caused to form conventional signs by the decomposition of water at the end of wires, conveying it so as to communicate intelligence; as in the telegraph of Sœmmering, of Munich, and that of Prof. Coxe, of Philadelphia, invented about the year 1810.

That it was practicable to convey electricity through wires of considerable length for these purposes had been ascertained by many experiments. For example, Steinheil states in his paper "upon telegraphic communications, especially by means of galvanism," translated and published in London in Sturgeon's Annals of Electricity, for March and April, 1839, page 446, that "Gauss* makes mention of a communication from Humboldt, according to which Betancourt, in 1798, established a communication between Madrid and Aranguez, a distance of twenty-six miles, by means of wire through which a Leyden jar used to be discharged, which was intended as a telegraphic signal."

But Winckler, in 1746, at Leipzic, "discharged several Leyden jars through a wire of considerable length, and on that occasion the river Pleiss formed part of his circuit.† Le Monier‡, in Paris, produced shocks through a length of wire amounting to 12,786 feet, about 2½ English miles. Watson‖ extended the experiment over a space of four miles near Shooter's hill, composing his circuit of two miles of wire and an equal distance of dry ground." A short time previous to this experiment of Wheaton, several members of the Royal Society caused the electricity of a Leyden jar to cross the river Thames in a wire laid on Westminster bridge, and return through the water a circuit of 880 yards; and they shortly after performed the same experiment through 8000 feet of water in New river, (Philosophical Transactions, vol. XLV, p. 49.) Similar experiments were performed by Dr. Franklin across the Schuylkill, in his celebrated Electrical Feast.

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* Gauss und Weber. Resultats d. mag. Vereins, vol. II, p. 14.
† Priestley's History of Electricity.
‡ Phil. Trans'ns, vol. XLIV, p. 1, 290.
‖ Do. do. vol. XLV, for 1748.

These references of Steinheil were verified by me in the Medical Library of Transylvania University. R. PETER.

The actual velocity of electricity, although ascertained to be very great by these experiments of Watson and others, was not actually measured until the time of the observations of Wheatstone, of England, the account of which was published in the Philosophical Transactions for 1834, and copied into the journals of science.

Magnetism was early suspected to have some connexion with electricity. In the Philosophical Transactions for 1746, vol. XLIV, p. 242, is published a notice of the disturbance in the polarity of a compass needle by the electricity produced by the friction of glass. But Oersted, of Copenhagen, was the first to give a definite form to the science of electro-magnetism.

After the discovery by Oersted, Ampére, Arago, Farraday, and others, about the years 1819 and 1820, that magnetic polarity existed in all conductors conveying electricity, which magnetic polarity caused the deflection of the suspended magnetic needle, induced temporary magnetism in soft iron or permanent magnetism in steel, when they were placed in the neighborhood of the wire or conductor conveying the electricity ; this new force, viz., the magnetic polarity, always present in a wire conveying electricity, multiplied by winding the wire into a long coil, was employed as the motive power in the formation of conventional signs for telegraphic purposes.

As early as 1820, this form of telegraph was proposed by Ampére, about the time when he was engaged in developing the initial facts of electro-magnetism first discovered by Oersted.

This proposal of Ampére, an account of which may be seen in Vail's pamphlet on the American telegraph, p. 133, was, according to Professor Steinheil, actually put into execution on a small scale by the late Professor Ritchie, (see Froriep's Notes, vol. XXVII, No. 6, page 86.) But Messrs. Gauss and Weber, in 1833, (see Steinheil's paper above mentioned, and Schumacher's Jahrbuch, 1837, p. 38,) constructed the first electro-magnetic telegraph of any considerable length with a single wire. Weber having ascertained "that a copper wire, 7460 feet long, which he had led across the houses and steeples of Göttingen, from the observatory to the cabinet of natural philosophy, required no special insulation." * * *

"The principle was thereby at once established of bringing the galvanic telegraph to the most convenient form." (Steinheil's paper above mentioned, page 448.)

About the same time, or earlier, at the end of 1832, the Baron de Schilling constructed an electro-magnetic telegraph at St. Petersburg, which is described by A. Vail in the pamphlet above mentioned, page 155, in which telegraph the conventional signs were made by the deflection of a magnetic needle or bar suspended in a coil of wire through which the electrical current was caused to pass. The deflection of the suspended magnetic needle or bar in a coil of wire, by means of the electrical current made to pass through the coil, is used in other electrical telegraphs, as in those of Wheatstone and Cook, Davy, Bain, &c. It was employed in those of Gauss and Weber, and Steinheil, and was

the method proposed by Ampére in 1820. The motive power in this form of the instrument may be supposed by persons not versed in electrical science to be different from that produced by the induction of magnetic polarity in a soft iron bar inserted in the coil of wire, which is the arrangement in the instrument of Morse; but it is a well established fact, that the motive power or dynamic agent is the same in these two cases—whether the soft iron electro-magnet is used, as in Morse's telegraph; whether the coil of wire conveying the electricity is caused to act on a suspended magnetic needle or bar, as in the telegraphs of Ampére, Schilling, Gauss and Weber, Steinheil, Davy, Bain, and others; or whether an electro-magnet, whose poles are alternately changed by changing the direction of the electricity through its coil, is caused to move by the attraction and repulsion of permanent steel magnets, as in the Columbian telegraph; the dynamic is the identical, being the magnetic polarity always present in the electrical current.

The only difference, then, in these several instruments for applying electro-magnétism to telegraphic purposes is in the peculiar mechanical contrivances used by the several inventors to form the conventional signs. For the magnetic polarity in the wire, or coil of wire, which conveys the current of electricity, is wholly independent of the presence of iron or steel. This magnetic polarity does not depend on the presence of metal of any kind, it having been demonstrated that an electrical current of any kind, passing through any sort of a conductor, always has magnetic polarity at right angles to the direction of the current as a necessary and invariable concomitant.

There is magnetic polarity in the coil of wire used by Ritchie, Schilling, Gauss and Weber, Steinheil, Wheatstone, Davy, Bain, and others, which caused the motion of their suspended magnetic needles or bars, as there is in the soft iron inserted into the coil of wire constituting the electro-magnets used by Morse, Barnes and Zook, &c., and the motion in all these instruments is caused by this magnetic polarity, which is a natural concomitant of the current of electricity.

The dinamic agent, therefore, is the same in all these various contrivances, and the principles, and the coils of wire, and electro-magnets employed in them, were all known to science long before they were thus applied to telegraphic purposes by the ingenious inventors of the mechanical arrangements.

These facts in regard to the presence of magnetic polarity as a natural concomitant of electricity were known to the scientific world, and recorded in the journals and books of science before any of these electro-magnetic telegraphs were invented; except, perhaps, in the case of Ampére and Ritchie, having been developed in 1819–'20; and the few following years by Oersted, Ampére, Arago, Farraday, Moll, Henry, and others. The idea, therefore, that any one could patent the attractive power of an electro-magnet appears to me to be as preposterous as that of patenting the elastic force of steam or the gravity of falling water.

My profession is that of professor of chemistry and pharmacy in the

medical department of Transylvania University, and professor of chemistry and geology in the academical department of the same university; the performance of the duties of which professorships constitutes the main business of my life.

Answers to the interrogatories of complainants.

1 and 2. I have resided in Lexington, Kentucky, for the last sixteen or seventeen years; have no business partners, and never had any interest of any kind in any invention or patent of an electric telegraph.

3, 4, and 5. My knowledge of electro-magnetic telegraphs has been acquired by the perusal of journals and other periodicals and books from England, France, Germany, and America, and has been mainly confirmed by experiments performed by me at various times since the year 1828 or 1829. I made a large electro-magnet for illustration in a course of chemical lectures which I delivered to the classes of the Western University of Pennsylvania, as early as 1829 or 1830, but did not prove that the galvanic current could be conveyed for a considerable distance through a wire; of which fact, however, I entertained no doubt, from my knowledge of the experiments of Winckler, Watson, and Franklin, above mentioned; nor did I doubt that the earth would serve as a conductor for one half of the circuit, as was proved by the same philosophers, and especially by Dr. Watson, who caused electricity to return through two miles of the earth's surface, at Shooter's hill, in a circuit of four miles. I have not tried it myself, except at short distances.

At what time I first heard of the fact that a telegraph, under the circumstances stated, had been constructed, I do not exactly recollect, but presume it became known to me by the perusal of the notice of Morse's and other telegraphs, published in Silliman's journal, in the journal of the Franklin Institute, of Pennsylvania, &c. A notice of Morse's proposed telegraph appeared in the October number of the former journal, and in the November number of the latter, both of the year 1837; but in a previous volume of the journal of the Franklin Institute, in the May number, 1837, page 406, appeared the following notice, which I also find published in the magazine of Popular Science, vol. 3, page 110, published in London, February, 1837, from which it was copied into the Franklin Journal, viz: "during the month of June, last year, (1836,) in a course of lectures delivered at King's college, London, Professor Wheatstone repeated his experiments on the velocity of electricity, which were published in the Philosophical Transactions for 1834, but with an insulated circuit of copper wire, the length of which was now increased to nearly four miles, the thickness of the wire was $\frac{1}{16}$th of an inch. When machine electricity was employed, an electrometer placed on any point of the circuit diverged, and wherever the continuity of the circuit was broken, very bright sparks were visible; with a voltaic battery, or with a magneto-electric machine, water was decomposed, the needle of a galvanometer deflected, &c., in the middle of the circuit. * * * Prof. Wheatstone gave a sketch of the means by which he proposes to convert his apparatus

into an electric telegraph, which, by the aid of a few finger stops, will instantaneously and distinctly convey communications between the most distant points. These experiments are, we understand, still in progress, and the apparatus, as it is at present constructed, is capable of conveying thirty simple signals, which, combined in various manners, will be fully sufficient for the purposes of telegraphic communication."

On a visit to London, in 1839, in the month of June, I saw in the Adelaide Gallery of Practical Science, in that city, two models of electro-magnetic telegraphs, which, I think, were the needle and lamp telegraph of Davy, and that of Alexander. At the same time I procured a copy of Sturgeon's Annals of Electricity; in the March and April numbers of which for 1839, in a translation from the German by J. Griggsworth, of Prof. Steinheil's paper, "upon Telegraphic Communications, &c., &c.," already mentioned, (page 439, continued on page 509,) in which he gives a very condensed history of the facts in relation to this subject, describes a plan of recording the signs of an electro-magnetic telegraph by means of black dots on an endless strip of paper moved over cylinders, and of making the signs audible by means of bells; he also describes in the same paper an instrument of the kind of his own invention, which had been erected between Munich and Bogenhausen in 1837. It is described in Vail's work.

The motion in this telegraph of Steinheil's was produced by the action upon suspended magnetic bars of the magnetic polarity of the electric current passing through a coil of wire, in the centre of which the said magnetic bars were suspended. These bars being thus deflected at right angles to the direction of the coil, whenever the electrical current was caused to pass through it, made and recorded the telegraphic signals by this motion. This was a telegraph with a single wire.

In this paper of Steinheil's I find the following remarks, which I transcribe, page 450. "It has been stated that Ampére required more than sixty wires, whereas thirty or so were sufficient for Sœmmering. Wheatstone and Cooke* reduced their number to five; Gauss, and probably in imitation of him, Schilling, and likewise Morse,† in New York, made use of but a single wire, running to the distant station and back. One might imagine that this part of the arrangement could not be further simplified; such, however, is by no means the case. I have found that even half of this length of wire may be dispensed with, and that with certain precautions its place may be supplied by the ground itself. * * * The experiments of Winckler at Leipzig had already shown us that with frictional electricity the ground may replace a portion of the discharging wire. The same is now known to hold good with respect to galvanic currents."

Steinheil states further, that his experiments had proved it to be possible to succeed in telegraphing with electricity without any metallic conductor for a distance of fifty feet; p. 452.

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* La France Industrielle, 1838. April 5, p. 3.

† Mech. Mag., No. 757. Silliman's Journal, Oct. 1837. Ann. of Electricity, vol. II.

At the time of my visit to London, I also procured the "Year book of Facts in Science and Art, published [in] London, February, 1839, exhibiting the most important discoveries and improvements of the past year," in which is the following statement, p. 32:

"The practical merits of the electric telegraph has already been tested on the London and Birmingham railway, and the result has been successful. Four copper wires, acted upon at each end of the line at pleasure, by the agency of very simple galvanic communicators, have been laid down on the line of the railroad to the extent of twenty-five miles," &c., &c.

The same work, page 33, contains a notice of Steinheil's progress in the invention of electric telegraphs, stating that he recorded his communications in a permanent manner by the punctures of fine needles on a sheet of paper, moved by the same apparatus, &c., &c.

In the volume of the same work, published March, 1840, it is stated, p. 29, that the galvanic telegraph of Mr. Cook and Professor Wheatstone had been in operation, without any obstruction, for a year between Drayton, Hanwell, and Paddington.

I did not visit either of these telegraphs while in England in 1839, but was credibly informed that the wires were soon after put up from London to Bristol, and the electric telegraphic put into successful operation for that distance. Indeed, it is stated in a letter of Prof. Morse, (published in A. Vail's pamphlet "on the American Telegraph, &c.," p. 89,) in which he mentions a series of experiments performed by himself, in conjunction with Prof. Fisher, in the summer of 1842, upon 33 miles of wire, that the telegraph of Prof. Wheatstone was established 200 miles in England."

I do not think that I saw a working model of Morse's instrument until within four or five years, and did not witness its active operations until it was erected in this city on the established line. I have already described the differences existing between the telegraphic instrument of Morse and that called the Columbian telegraphic instrument, &c., &c.

Answer to interrogatory 6. I do not know that any one previous to Steinheil proposed or accomplished the recording of signs at a distance for telegraphic purposes, unless it be true, as stated in the American edition of "Müller's Principles of Physics and Meteorology," by the American editor, (Philad'a, 1848,) that Dr. Coxe, in Philadelphia, about 1810, proposed a telegraph "founded on the instantaneous passage of the electric current, and its power of producing chemical changes upon prepared paper," p. 459; an application which was very obvious to men of science, and which was subsequently used in an electric telegraph of Edward Davy's invention. See Vail's pamphlet, above mentioned, p. 187. And further saith not

ROBERT PETER.

STATE OF KENTUCKY,
Fayette county and city of Lexington, sct.

The above deposition of Robert Peter, M. D., was taken, subscribed,

and sworn to before the undersigned, judge of the Lexington city court, at the time and place and for the purposes stated in the caption thereof. Given under my hand, this 19th day of May, 1849.

GEORGE R. TROTTER,
Judge of the Lexington city court.

The following affidavits were read by the defendants on the trial of this cause, to wit:

Affidavit of C. B. Moss.

(Affidavit of Charles B. Moss, to wit:)

Charles B. Moss, of the city of Washington, district of Columbia, having been duly sworn, states that he has been for the last sixteen years, more or less, engaged in the study and investigation of electricity, magnetism, galvanism, and electro-magnetism, and of their applications; and in relation to the application of these sciences to the communication of intelligence, he furthermore states—

That the first electrical telegraph of which he has seen any record was proposed in the year 1774. It was suggested by three facts, which had been well ascertained some few years previously, viz. 1st, That static or frictional electricity could be discharged over metallic conductors of great length. 2dly, That the time occupied by said discharge was inappreciable; or, in other words, that electricity traversed the circuit almost instantaneously. 3dly, That the presence of the electricity "could be made visible," by its effects, "in any part of a circuit."

That the first telegraph, by which intelligence could be communicated to one of the stations of a line, by means of the chemical powers of a current of voltaic electricity, generated by the pile, and manipulated at the other station, was proposed in the year 1807.

That the first electro-magnetic telegraph was proposed in 1820, the same year in which the science of electro-magnetism was clearly presented to the world.

That the first electro-magnetic telegraph which permanently recorded in alphabetic characters the intelligence it transmitted, was in practical operation on a line of telegraphic communication exposed to all vicissitudes of atmospheric electricity, in the year 1837.

In corroboration of the assertions here made, the affiant states the following facts, with references to the sources where they were obtained, in the truth of which he verily believes, viz:

On the 12th November, 1746, M. Le Monniere, the younger, M. D., read before the Royal Academy of Sciences of Paris a memoir, detailing a series of experiments which he had then recently made, in order to test objections which he entertained to some of M. Du Faye's doctrines in electricity. As some of these experiments prove M. Le Monniere to be the first electrician who discovered, 1st, That the electric discharge could be transmitted through metallic circuits of great length; 2d, That he was the first who demonstrated that static or machine elec-

tricity could be passed through or over large bodies of water; and, 3d, That he was the first who endeavored to ascertain the velocity with which electricity passes through the circuit. It is proper to state his experiments here in detail, but without further reference to the object which had induced him to undertake them.

Experiment No. 1. As to the length of metallic circuit through which the electrical charge could be passed; M. Le Monnier passed a shock through an iron wire some two thousand toises, or nearly two and a half miles in length, notwithstanding that the wire laid on wet grass, newly ploughed ground, &c., throughout most of its length.

Experiment No. 2. As to the conductibility of water. He laid an iron chain around a portion of the circumference of one of the basins of the Tuilleries, having a surface of about an acre; an assistant held one end of the chain in his left hand, whilst his right was immersed in the water. Diametrically opposite the first there was a second assistant, who held the other end of the chain in his right hand, whilst he grasped a Leyden phial, "well electrified," with his left. When this assistant touched with the wire of the phial "an iron rod, fixed upright in a piece of cork, that floated near the edge of the basin, at that instant both observers felt a violent shock in both their arms;" proving that the line of water between them had formed part of the circuit of which the chain was also a part. A similar experiment, on two basins of water connected, in order, as the author quaintly remarks, "that it might appear distinctly that the electric effluvia did really pass along the superfices of the water."

Experiment 3d. His experiment to ascertain the velocity of electricity consisted in taking a shock through an iron wire of 950 toises, suspended by silken thread, and bent in the middle, so that the two legs were nearly or quite parallel, but he could not observe as much difference as a quarter of a second between the time of closing the circuit by the discharge of a Leyden phial and that of his experiencing the shock. From this, and a subsequent experiment, M. le Monniere inferred that the velocity of electricity was too great to be determined with any degree of precision. It is shown, too, by these experiments, that electricity follows the best conductors. See Philosophical Transactions, Martyn's abridgement, vol. 10, pages 336, 338.

These experiments were immediately repeated by many other philosophers, among whom John Henry Winkler, then professor of ancient languages in the University of Leipsic, is mentioned by Steinheil as having in 1746 discharged several Leyden jars through a circuit formed by a part of the river Pliess and a wire of considerable length. See Sturgeon's Annals, vol. 3, page 445.

The experiments of Dr. William Watson in reference to the conductibility of water, long metallic circuits, and the velocity of electricity, were made during the months of July and August of the year 1747.

From the extent of the scale on which they were conducted, and the great sagacity and address displayed in the manipulation, their results were received with the greater confidence, and as vigorously verifying

the conclusions of Le Monnier. But they were chiefly remarkable for the important discovery to which they led, viz: That dry ground could be made part of an electrical circuit, which was made at Highbury Barn, August 5th. As this station was situated in a bend of New river, it was supposed that the ground circuit was moist, and that its conductibility was entirely due to this circumstance; but to relieve the subject from all source of doubt, it was determined to repeat the experiments in a circuit double the length of the former at Shooter's hill. "As only one shower of rain had fallen during the preceding five weeks, the ground could not be but very dry; and as no water was near, if the electrical commotion was felt by the observers at the stations, it might be safely concluded that water had no share in conducting it." On the 14th of August, a circuit was formed of two miles of wire supported on sticks of baked wood, and of the ground circuit comprised within the extreme stations, and of course also two miles in extent, and making an entire circuit of four miles. The Leyden jar was repeatedly discharged through the circuit, and the shocks were distinctly and generally severely felt by the observers placed within the circuit. These results established the fact that dry ground could be made part of an electrical circuit.

Many experiments were very carefully and skilfully made, at the same time, to deduce the velocity of electricity, by noting the time which elapsed from observing the electric shock and the flash of a gun till the report was heard—a very rude method, it must be admitted. The general conclusion of the observers, however, appears to have been, "That, by comparing the respective velocities of electricity and sound, that of electricity, in any distance yet experienced, is nearly instantaneous." It may be added that a similar set of experiments on the velocity of electricity were carried out on the 5th of August, 1748, by some of the gentlemen who had assisted Dr. Watson, when the experimenters "were fully satisfied that, through the whole length of the wire, being 12,276 feet, the velocity of electricity was instantaneous." See Philosophical Transactions, Martyn's abridgement, vol. 10, page 347."

Our own Franklin, whose researches furnished so much and such valuable material for the structure of electricity, and whose beautifully simple theory gave it form and style; whose brilliant discoveries were made but to benefit his kind; Franklin seems to have been long and familiarly acquainted with the most of these facts; for, in a letter to his English friend, Peter Colinson, esq., written at Philadelphia in 1748, he gives a very interesting detail of the amusing manner in which they were to be applied, at an electrical feast to be held on the Schuylkill, as a proper termination for the season of the labors of himself and his brother electricians. See Franklin's Works.

It has been well observed by the celebrated Dr. Robert Hall, that, "with Franklin's discoveries, the science of mechanical electricity reached its meridian splendor." The only exceptions which might be made to this, may be the few developments made by recent researches

in relation to the chemical and magnetic action of this agent, and some learned disquisitions on its true theory, as to whether there is but one fluid according to his theory, or two fluids according to that of Dufay; or, finally, whether the phenomena may not be more easily explained by the hypothesis of undulations, as in the case of sound, light, &c.; but with these exceptions, the department of mechanical or frictional electricity has received but comparatively little attention since the time of Franklin.

This temporary neglect of the science may be attributed, in a great degree, to an accidental discovery, the results of which have not only powerfully aided in the development of chemistry, and given birth to new arts and processes, but has exercised a wonderful influence on social intercourse. Luigi Galvani, professor of anatomy at Bologna, had observed that a current from an electric machine passing through the nerve of a dead frog would cause muscular contractions. A strong advocate of the doctrine of animal electricity, he was at no loss for an hypothesis, either to account for the phenomena, or to conduct future investigations; and, after various experiments, was led to the new fact, that when the nerve and muscle were connected by a metal, the contractions occurred in the same manner as they had done under the influence of the current. Galvani explained this by assuming, in accordance with his favorite theory, that the surface of the muscle was in one kind of electrical state, whilst the nerve was in the opposite; that the metal connecting them, playing the part of a discharging-rod, produced the electrical equilibrium, the same as in the discharge of a Leyden jar, and the muscular contractions were the consequence. This hypothesis, however plausible it might be, was not received by scientific men generally.

Alexander Volta, then professor of natural philosophy in the University of Pavia, who had carefully repeated and extended the experiments of Galvani, declared it to be untenable. He proved that it was necessary to use two different metals to produce contraction; that the contact of heterogeneous metals develop electricity, and it was to the electricity thus produced, and not the electrical state of the nerve and the muscle, that the contractions were due.

In support of his views, he undertook a series of experiments on the electricity excited by the simple contact of different metals, which finally led him to the discovery of the apparatus known as Volta's Pile.

It may not be out of place to give a general idea of the principle and action of the pile, as it was the germ of the battery now used as the electrometer on all telegraphic lines; as the simple contact of a single pair of metallic plates, one of silver and one of zinc, will develop a certain quantity of electricity, it is plain that the effect will increase in some manner with the increase of the number of metallic pairs. This is the principle. Now, if we pile up a number of silver discs, taking care that the zinc and silver regularly alternate in the series, and if we place between each pair a wet cloth, we form an apparatus embodying and multiplying the principle; and if the extreme

discs of such pile, composed of a sufficient number of pairs, be touched by moistened hands, a shock will be received; and when wires attached to them are made to touch and separate, sparks will be seen. Such is the apparatus of which Volta communicated a description to the Royal Society in a letter dated Como, 20th March, 1800. See Philosophical Transactions for the year 1800, page 403.

It is apparent, from this communication, that Volta had no knowledge of the chemical power of his own pile. The discovery is due to Messrs. Nicholson and Carlisle, by whom it was made on the 2d May, 1800, whilst engaged in repeating Volta's experiments. It happened that the polar wires came in contact with a drop of water, which was immediately thrown into a state of effervescence, accompanied by the peculiar odor of hydrogen gas. The facts suggested the chemical power of the pile, and an experiment was at once instituted to test the correctness of the suggestion. A glass tube containing water was corked at each end, and two brass wires were introduced, one through each cork into the tube, the ends approximating but not touching each other. The free end of each wire was then connected with a terminal plate, or pole of the pile, and the decomposition of the water immediately commenced, as in the case of the drop of water.

But another effect was now noticed, that the bubbles appeared at the end of that wire connected with the silver end of the plate, whilst the end of the wire connected with the zinc plate became at first discolored, and ultimately blackened. It was a question, now, whether this discolorization of the wire did not arise from a combination of the disengaged oxygen with the brass, and if it did, it was manifest that the other gas disengaged and collected must be hydrogen, and would therefore explode when mixed with a proper volume of atmospheric air. To determine the point, the gas collected was mixed with an equal butt of atmospheric air, when on applying flame to the compound it exploded. It was thus demonstrated that water had been decomposed into its constituent elements, oxygen and hydrogen, and that the discoloring of the wire, and the non-appearance of the oxygen, was a consequence of the combination of the latter with the metal of the wire. This experiment showed also that water is a conductor of voltaic, as it had been proved, (see ———,) it is of frictional electricity.—London Encyclopedia, 1845, vol. 8, page 97.

Valuable as the pile proved to be to the experimenter, yet its use and management were attended with much inconvenience and trouble. In proportion as the number of pairs in the pile was increased, the greater was the pressure on the wet cloths interposed between the lower pairs of discs. The consequence was that the solution used to moisten them, and discharging an important function in the operation of the pile, exuded, and the duration of the action of the pile considerably lessened. Besides this, the zinc plates would become oxydized by the action of the solution, which it was necessary to remove; and to re-saturate the cloths and clean the pile, required that the latter should be taken to

pieces. This led to the invention of the trough battery by Cruikshank, shortly after the introduction of the pile into England.

The invention of the Cruikshank battery was followed by other modifications of the pile, of which the trough constituted an important element. It was with these newly contrived apparatus that Sir Humphrey Davy, shortly after the discovery of Nicholson and Carlysle, commenced that brilliant career of electro-chemical research so productive in the wonderful results which revolutionized the whole science of chemical philosophy. Commencing his investigations with the decomposition of water, he not only verified, by the most delicate methods, the experiments of the gentleman just named, but he demonstrated the analytic powers of the voltaic current by its decomposition of the solution of the salts of the earth and alkalis. See works [of] Sir Humphrey Davy, edited by his brother, Jno. Davy, M. D., &c. London, 1839.

From the time of the invention of the pile, it was generally conceded that the force it developed was electricity, but in a modified form; and the rationale of its evolution maintained by the scientific was the same as that originally given by Volta, viz., the contact of heterogeneous metals.

Yet, considering that the efficient action of the pile depended as much upon the presence of cloths, or other fabric, moistened by some kind of fluid, as it did upon that of the metals, and that the absence of such fluid rendered it inoperative, it was suspected at least that this action was as much the result of the chemical reaction between the fluid and the zinc as it was of simple contact. Experiments on the trough battery not only strengthened this suspicion, but finally led to the more general assumption that it was to such chemical reaction between the fluid and the oxydable metal that the action of the battery or pile was mai[illegible] due—mere metallic contact being necessary only to closing the [illegible]it, in order to permit this reaction to proceed unrestrained [illegible]

Although the battery was certainly a great improvement on the pile, yet its inherent defects caused great embarrassment to philosophers. It was observed, simultaneously with its introduction, that, the same as in the pile, the force of the current was greatest in a very few moments after the immersion of, or throwing, the excited fluid (which replaces the saturated cloths of the pile) upon the plates, and from that moment it rapidly decreased till it became evanescent. Besides this, the zinc plates required frequent cleaning, and the saline or acid solution required as frequently to be renewed or strengthened.

In the investigation instituted to ascertain the general laws which govern the action of the voltaic current, it is evident that no confidence could be accorded to the results obtained when such electrometers had been employed.

These defects, too, would present insuperable obstacles to the practicable application of any voltaic electro-magnetic arrangement requiring great duration and of constant force, such for instance as electro-mag-

netic engines, electro-type apparatus, or electro-magnetic telegraphs, required to be in operation continually.

In view of such applications, attention was now directed chiefly to the diminution of these objectionable features, and chemistry made ample compensation for the brilliant service rendered her by electricity, by furnishing laws to guide the analysis of the battery preparatory to its improvement.

The problem to be solved was to construct an electrometer, such that its current should be constant in force and of considerable duration.

Although such were the special objects which had enlisted the attention and efforts of electricians, it would be improper not to mention that Prof. Robert Hare, of the University of Pennsylvania, had distinguished himself, and had rendered good service to science by his valuable improvements, at an early day, on other parts of the battery. His efforts, however, appear to have been [so] confined to the experimental test of his original and beautiful theory, that the quantity of two of the constituents of the voltaic current, heat and electricity, were evolved in this proportion, viz: "The caloric being to the electricity as the extent of generating surface to the number of the series."

His calorometer and deflagrator were the triumphant evidences of his theoretical views. See Hare's Lectures and Essays.

The first to obtain a certain degree of constancy in the action of the battery, by a new modification of its elements, were Prof. Richie and M. Becquerel, pére. The latter, in 1829, constructed a battery which with proper attention would maintain the current of nearly constant force for about an hour and a half. See London and Edinburg Philosophical Magazine, 1842, vol. 20, page 296, et seq.

The next important step in the march of improvement was made by Mr. Warren de la Reu, of which the Encyclopedia Britannica, 1842, vol. 21, page 668–'69, says, that its value was the consequence of his "using a solution of sulphate of copper as the exciting [illegible] voltaic batteries. Oxygen is thus supplied to the zinc by the oxide of copper; no gas is evolved; and, the action being thus rendered continuous, the effect is fully equal to that momentarily produced by immersion in acids."

This was followed, in the year 1836, by the improvement of Prof. Daniell, of which the same work speaks as follows:

"Notwithstanding the numerous improvements which have been made in the voltaic battery, no successful attempts had been made till the time of Prof. Daniell, to discover the causes of the variations and decline of its force after the first immersion of the plates in the diluted acid. The principle causes of these variations he proved to be the evolution of hydrogen gas from the negative surface, which not only consumes a considerable portion of the generated electricity, but reduces at the conducting plates the oxide of zinc formed by the action of the battery at the generating plates; and here the conducting plates were ultimately so encrusted with metallic zinc as to diminish, and finally annihilate, the circulating force. Hence he was led to the con-

struction of what he calls a constant battery, for producing an invariable current of force, and therefore applicable to many important researches which cannot be successfully carried on under variation of the voltaic current. But beside the attainment of this great object, Prof. Daniell considers it as promising the following advantages:

1st. The abolition of all local action by the facility of applying amalgamated zinc.

2d. The trifling expense of replacing the zinc rods when worn out, and the total absence of any wear of the copper.

3d. The dispensing with the use of nitric acid, and the substitution of the cheaper materials, sulphate of copper and oil of vitrol, and the absence of any annoying fumes. And,

4th. The facility and perfection with which all metallic communications may be made, and different combinations of the plates arranged. See Encyclopedia Britannica, 1842, vol. 21, page 669

Subsequent to the discovery and invention of Prof. Daniell, numerous forms of constant batteries have been proposed, such as Smee's, Grove's, Silliman's, Bunson's; but the most valuable among them, at least for telegraphic purposes, is that of Grove, and the only one now used on all telegraphic lines. It was proposed in a memoir read before the French Academy on the 15th of April, 1839, and immediately adopted wherever constancy and energy in the voltaic current are required.

The most valuable characteristics of the Grove battery, which make it unequalled as a hydro-electrometer for telegraphic communications, are—

1st. The uniform character of its current.

2d. The great energy of the current produced by a few pairs.

3d. The comparatively diminutive size of the active surface of a single pair.

4th. The great duration of its action.

See London and Edinburg Magazine, vol. 15, page 287. (As evidence of this it may be stated, and on the information and experience of several gentlemen who are at present in town, that the Grove battery will, with proper attention in preparation, act uniformly for three weeks without requiring renewal of the amalgamation, and only such occasional supply of nitric acid, &c., as will replace the loss produced by evaporation, and the slight dilution of the nitric caused by the absorption of hydrogen of the decomposed water. In one instance it is known to have acted well for forty-five consecutive days.)

This may be the proper place to notice an important fact, which at first threw some doubt on the practicability of electro-telegraphic communication, but which was most happily removed, so far as it relates to telegraphs using temporary magnetism by the original mode of investigation, with the consequent invention of Professor Henry, then of Albany academy, subsequently professor of chemistry, &c., at Princeton, and now corresponding secretary of the Smithsonian Institute, Washington, D. C.

The conducting power of wires is now alluded to. In a paper entitled, "On the laws of electro-magnetic action as depending on the length and dimensions of the conducting wire," &c., &c., by Peter Barlow, F. R. S., published in the Edinburg Philosophical Journal, &c., vol. 12, page 105, January, 1825, the law of conducting power of wires is for the first time introduced as one of the important elements of an electro-magnetic telegraph. From this paper the following extract is made: "In a very early stage of electro-magnetic experiments it had been suggested that an instantaneous telegraph might be established by means of conducting wires and compasses. The details of this contrivance are so obvious, and the principles on which it is founded so well understood, that there was only one question which could render the result doubtful, and this was, is there any diminution of effect by lengthening the conducting wire? It had been said that the electric fluid from a common electrical battery had been transmitted through a wire four miles in length (see § ——) without any sensible diminution of effect, and, to every appearance, instantaneously; and if this should be found to be the case with the galvanic circuit, then no question could be entertained of the practicability and the utility of the suggestion adverted to. I was, therefore, induced to make the trial, but I found such a sensible diminution with only two hundred feet of wire, as at once to convince me of the impracticability of the scheme. It led me, however, to an inquiry as to the cause of this diminution, and the laws by which it is governed."

This discovery of Prof. Barlow might have been deduced, to a great extent, theoretically, had reference been had to a previous discovery of Sir Humphrey Davy, in relation to difference in manner in which each of the two forms of electricity, the common and voltaic, is conducted by metal. It had been long known that common electricity was conducted over the surface of the metal, while Davy "found, as might have been expected, that the conducting power of wire for electricity, in batteries of the size and number of plates first described, was nearly as the mass! Thus, when a certain length of wire of platinum discharged one battery, the same length of wire of six times the weight discharged six batteries; and the effect was exactly the same, provided the wires were kept cool, whether the mass was a single wire, or composed of six of the smaller wires in contact with each other; this result alone showed that the surface had no relation to the conducting power, at least for electricity of this kind; and it was more distinctly proved, by direct experiment, equal lengths and equal weights of wire of platinum, one round and one flattened, by being passed transversely through rollers to six or seven times the surface, were compared as to conducting power! The flattened wire was the best conducting power in the air from its greater cooling powers; but in water no difference could be perceived between them." See Philosophical Trans., 1820–'21.

As to this essential difference in the manner in which each kind of electricity (so to speak) is conducted, and which has formed the distinc-

tive of each, experience of the widest extent has confirmed Davy's doctrine. Dr. Ritchie, in the Philos. Trans. for 1832, page 279, remarks:

"Common electricity is diffused over the surface of the metal; voltaic electricity exists within the metal; free electricity is conducted over the surface of the thinnest gold leaf as effectually as over a mass of metal having the same surface! Voltaic electricity requires thickness of metal for its conduction."

The law deduced by Barlow was, that the conductibility of wires of the same metal is inversely as the square of the lengths, and directly as their diameters; but, in view of experiments conducted with some care about the same time, the law was not generally received. In a paper read to the Academy of St. Petersburg, Nov., 1834, detailing his recent and most elaborate experiments in order to determine this law, Professor Lenz remarks: "The first more accurate experiments on this subject were made at a later period by means of the electrometer and the voltaic pile," and the experiments of Davy, Pouillet, Becquerel, Christie, Ohrn, and Techner prove the law, that wires of the same metal conduct electricity inversely as their lengths and directly as their sections."

It is this law last announced, known sometimes as Lenz's law, that is generally received; and no experience, so far as known, has yet conflicted with it. See Taylor's Scientific Memoirs, 1837, vol. 1st, p. 311.

Enough has been adduced to show the vastness of the obstacle presented to the first who proposed carrying out the project of an electromagnetic telegraph.

The last proposition will show a mistake of a chief property of the voltaic current, displayed in Professor Morse's first patent of June, 1840. Detailing the various materials of which "the circuit of conductors may be made," it asserts that it may be of cord or twine gilt, silvered, or covered with any thin metal leaf properly insulated," &c. In the reissues of the patent the erroneous assertion has been omitted.

Another important fact, in relation to the conduction of voltaic electricity, was determined by Jean Aldini in the year 1803. It is that water is a conductor of galvanism as well as of common electricity, and that the voltaic current may, with proper precautions, be projected across rivers, and even through arms of the sea. The experiments on rivers were conducted on the Seine and Maine on 21st May, 1803, and those on the sea at Calais on the 27th of the preceding February. In all Aldini's experiments he used the voltaic pile, consisting of 80 discs of silver and zinc. See Essai theorique et experimental sur le Galvanisme, par le Prof. Jean Aldini. Paris, Aug. 12, 1804. Second partie.

The experiments of Le Monnier and Watson to ascertain the velocity of common electricity have already been noticed.

It may now be stated that Professor Wheatstone, in 1834, with a very superior apparatus, made a series of experiments with the same object. The important result was, "that the velocity of electricity

through a copper wire exceeds that of light through the planetary space." See Philos. Trans. for 1834, p. 583.

M. Aldini was the first to experiment on the velocity of voltaic, as Le Monnier, Watson, and Wheatstone had done on that of the common electricity. After several experiments, he concluded that "the time of the passage of the fluid was not in anywise measurable by a clock which beat half seconds." See Aldini's Essai, &c.

Dr. Steinheil was the first to pass through a portion of the earth magneto-electricity, or that which permanent magnets induced in coils of wire surrounding the soft iron which moved in front of them. He was the first to use a ground circuit on the line of his recording telegraph, built and operated in 1837; the electricity used for this line being magneto-electricity as just mentioned.

The first philosopher who demonstrated that voltaic electricity could be conducted by the earth, and to use a ground circuit for this kind of electricity, was Dr. Joseph Henry. He made the experiments shortly after becoming professor at Princeton college, in illustration of his lectures on the Electro-magnetic Telegraph.

The affiant received this information from a gentleman who could not be mistaken as to the fact, and whose truthfulness none may doubt.

The effects of lightning on steel implements and the mariner's compass, inducing magnetic qualities in the former, and changing or destroying the poles of the latter, had long been known, and had led to a vague notion that there was some analogy in the natures of electricity and magnetism.

To approximate a judgment on the point, the Electoral academy of Bavaria, in the year 1774, proposed the following as a prize question: "Is there a real and physical analogy between electric and magnetic forces?" &c., &c.; see Roget's Electricity, 1832, part Electro-magnetism, p. 1, which in fact offered a new field for research. From this time much industry and ingenuity were expended on the question, but nothing approaching a satisfactory solution appeared till John Christian Oersted, professor of philosophy in the University of Copenhagen, announced his great discovery of electro-magnetism in a Latin communication, dated Copenhagen, July 21, 1820, addressed to Dr. Thomas Thompson, editor of the Annals of Philosophy. The communication was translated and published in the "Annals," from which it appears that the discovery was made in the year 1819, and experimentally illustrated by Oersted before his class at the university in his lectures on electricity, galvanism, and magnetism, during the winter of 1819-'20. See Thompson's Annals of Philos., vol. 16, p. 373.

The announcement of this discovery created the most intense excitement amongst the learned of both hemispheres. The letter was immediately translated and republished in all the languages of Europe. Oersted's experiments were eagerly repeated, varied, and extended, and gave birth to a series of discoveries as wonderful and interesting as they were novel. No science, perhaps, can boast of that rapid development which electro-magnetism exhibited at the very dawning of its

existence. In the catalogue of names distinguished for early and successful research in the new science, may be mentioned more particularly the names of Ampere, Arago, Biot, Davy, Henry, Sturgeon, and Schweiger; and as it may tend to throw some light on the details of the subject now under consideration, it may not be improper to present, after a proper reference to Oersted's, a summary of such of their discoveries as are more immediately connected with the rise and progress of the Electro-magnetic Telegraph.

Suppose a magnetic needle, such as that of the surveying compass properly poised on its pivot, to be at rest in the magnetic meridian, and that a wire be arranged over, and parallel to, this needle, and in the same vertical plane. If now the ends of the wire be made to communicate, respectively, with the poles of a voltaic battery, the needle will be deflected. If the current be made to pass along the wire from north to south, the north end of the needle will point towards the east. If the current be made to pass from south to north, the same end of the needle will point to the west. Again, if the wire be placed under the needle, the deflections will, other things the same, be the reverse of what they were when the wire was over the needle. Suppose the wire to be placed vertically in the magnetic meridian, and near either pole of the needle; then, if the current be made to descend, the pole will move to the west; if the current be reversed, the pole will point to the east. These are the principal features of Oersted's discovery; see Thomson's Annals of Philosophy, vol. 16, page 273, et seq.

These effects of the wire on the needle suggested the idea that the wire, whilst the current was passing through it, was itself magnetic. Arago and Davy proved this to be the fact nearly about the same time, and by the same test, viz., by iron filings brought near the wire, by which they were immediately attracted, and to which they adhered till the circuit was broken, when they immediately fell off. Arago's experiment was made about the 25th September, 1820, that of Davy on the 12th November, 1820. See Phil. Trans. for 1820, p. 7, and Encyclopedia Britannica, vol. 21, page 686.

The deflecting power of the writing wire, supposing the length to remain constant, was governed entirely by the quantity of the current passing through it, and when this was small the deflection of the needle was of course diminished. An instrument, however, was proposed, by which the effect of a current of very small quantity could be made as powerful as that of a more considerable one passing the single wire. As it forms the basis of the first recording telegraph, Oersted's description of it is given at length.

"On the electro-magnetic multiplier of Schweiger, &c., by M. Oersted. Immediately after the discovery of electro-magnetism, M. Schweiger, professor at Halle, invented an apparatus well adapted for displaying, by means of the magnetic needle, the feeblest electric currents. The effects of this multiplier (is based) on the equal action exercised on the needle by all parts of the conducting wire when it transmits a current. When a portion of this wire is bent like a, b, c, (fig. 1,)

[For figures 1 and 2 see original.]

If the two branches, a, b, and b, c, are in a vertical plane, and a needle, d, e, is suitably suspended in the same plane, we may easily conceive that the needle must receive an impulsion double of what one of those branches would have communicated. In fact the impulsions given to the needle by the two horizontal portions of the wire are added together. To be satisfied of this, we have merely to observe, that in the actual arrangement these portions are presumed by the electrical *electrical* current in two different directions. The upper wire and the under wire cause the declination of the needle to the two opposite sides only in the case when electricity moves in it in the same direction. We shall, therefore, increase the effect by giving the conducting wire several convolutions round about the needle as shown in fig. 2. It is this which constitutes the electro-magnetic multiplier."—See Quarterly Journal of Science, &c., vol. 16, pp. 123–'4.

A recurrence to what has already been said of Oersted's discovery will remove any apparent obscurity in the foregoing description.

Although the attraction of iron filings by the wire connected with the poles of the battery in the experiments of Arago and Davy, proving its magnetic state, would naturally lead to the inference that this wire would communicate magnetism to iron and steel wire or needles; yet there was nothing in the experiment on which the distribution of polarity could be predicated, particularly if the different directions be given to the needle in relation to that of the wire. Davy seems to have considered this, and to have instituted experiments to ascertain the law. But it is only necessary to notice that one which may be considered as the experiment which is the embryo of the electro-magnet. "I attached small longitudinal portions of wires of platinum, silver, tin, iron, and steel in transverse directions to a wire of platinum that was placed in the circuit of the same battery. The steel and iron wire immediately acquired poles in the same manner as in the last experiment. The other wires seemed to have no effect except in acting merely as parts of the electrical circuit; the steel retained its magnetism as powerfully after the circuit was broken; the iron wire immediately lost part of its polarity, and in a very short time the whole of it." See Davy's letters to Dr. Wallaston, Phil. Trans., for 1820–'21.

The magnetic experiments of Arago seem to have been confined to steel needles, and in which he was materially assisted by the suggestion of Ampere, by converting the uniting wire of the battery into a helix; a contrivance for multiplying the inducing power of this wire in imitation of Sweiger's instrument just described. The following extract from Biot's report to the Academy, a beautiful instance of physical reasoning, gives a very interesting account of the first use of the helix in the induction of magnetism. Speaking of the labors of the commission appointed by the Academy to examine into and report on the dis-

covery of Oersted, he states that "in the different arrangements which we have just described, the conjunctive wire, (i. e., the wire uniting the poles of the battery,) and the magnets, attract or repel principally by their most contiguous parts; for with regard to the rest, their distance rapidly diminishes their action. Hence it is evident that we should augment the energy of the effects, if we approximate together the different parts of the conjunctive wire, preserving to them, however, the same general line of action. M. Ampere has also verified this position by coiling the conjunctive wire in the form of a flattened spiral on the planes of whose contours he acts with magnets as on the side of a single wire." Among the arrangements which he has thus formed, one of the most remarkable consists in winding the conjunctive wire around a cylinder of wood or glass, forming an elongated spiral. Then the force emanating from each point of the wire being always directed transversely to its length, becomes in each element of the spiral perpendicular to the plane of the coils, and consequently parallel to the length of the spiral itself. Farther on account of the convolutive character of the force, all the inner points of the different rings exercise the interior of the spiral forces which are equal and operate in the same direction, whilst in action exteriorly the forces emanating from the different points of each ring oppose and weaken each other greatly by their obliquity. Thus the result of all these actions ought to be much more energetic within the spiral than outside of it; a consequence which actually happens.

"If we place in the interior of the spiral unmagnetic steel needles, they will acquire in a few instants a permanent and very perceptible longitudinal magnetism; whereas if we place them without the spiral, they suffer no change. This experiment is due to M. Arago." See Quarterly Journal of Science, &c., vol. 11, p. 288.

These experiments would show that the application of the magnetizing power of the helix was confined entirely to steel needles or to the production of permanent magnetism.

It was reserved for Sturgeon afterwards, editor of the annals of electricity, to be the first to exhibit the great magnetic power which could be developed in soft iron by the inductive influence of the current, and to him the honor is due of having produced early in 1825, after numerous experiments, the first electro-magnets, both of the straight bar and horse-shoe forms. They were formed of soft iron rods about a half inch in diameter, and surrounded by a single copper wire, wound spirally from pole to pole. In relation to their lifting power, Sturgeon states that "an electro-magnet of the above description, weighing three ounces, and furnished with one coil of wire, supported fourteen pounds." See Annals of Electricity, vol. 10, pp. 222–'3.

Dr. G. Moll, professor of natural philosophy in the University of Utrecht, saw, when in England in 1828, one of Sturgeon's electro-magnets. After an exhibition of its powers, concluding that the degree of magnetism depended mainly on the quantity of the current, he supposed that it might be increased by an increase of battery. In accord-

ance with this view he constructed various apparatus, till he obtained a lifting power of one hundred and fifty-four pounds, which, when compared with the power of the Sturgeon magnet, must be admitted to not only have evinced a great advance in the mode of developing magnetism, but to give a coloring of plausibility to the hypothesis of Moll, as to his method of developing the maximum of magnetism from the same mass of iron. In the apparatus by which he obtained such a lifting power, it is proper to state, in view of what is to follow, that the iron of his magnet was a bar of two and a quarter inches diameter, and when bent into the U form was twelve and a half inches high. The battery employed to induce magnetism in this mass of iron, by means of the coil then in use, was the common copper zinc battery excited in the usual manner, having an active surface of eleven square feet. See Silliman's Journal, vol. 19, page 329.

Professor Joseph Henry, of the Albany academy, in the State of New York, was engaged about this time, viz., 1828, in pursuits of the same kind. He produced a magnet, however, of immensely superior power, which sustained, under one modification of its peculiar arrangements, the weight of seven hundred and fifty pounds; whilst, under another, the least weight supported was one hundred and forty-five pounds. This will appear the more extraordinary after what has been said, when the dimensions of the iron and the active surface of the battery are considered in relation to those belonging to Moll's apparatus. Henry's horse-shoe was made of a bar of soft iron two inches square, hammered on the edges, twenty inches long, and when bent into form was only nine and a half inches high. The battery employed in the experiment when the greatest weight was sustained, had just one square foot of zinc surface, and in the case when the weight supported was only one hundred and forty-five pounds, the active surface of the pair was only four-fifths of a square foot.

With such a difference between the electrometers of the two experimenters, to say nothing of the difference in the masses of their magnets, it may be asked, what cause is there for the superiority of the American magnet over the Dutch, which was so far superior to the English? The answer is easy. It may be found in the more philosophical view of the American, which are best expressed in his own words. Speaking of Moll, an account of whose experiments had reached him after he had concluded his own on principles which had been known to him some two years before, Henry says, in relation to the two sets of experiments: "His (Moll's) object, however, was different, being only to induce strong magnetism on soft iron with a powerful galvanic battery. The principle object in these (Henry's experiments) was to produce the greatest magnetic effect with the smallest quantity of galvanism." And how did he effect it? Simply by the scientific manner of constructing his coils. The coils of the Sturgeon magnet was a short wire which was loosely coiled around the iron in a comparatively few turns, commencing at one pole and terminating at the other. The coil of Sturgeon was used by Moll, and in fact till Henry's mode was made

public, no other form of coil than that of Sturgeon was known or used. Henry to make his coils capable of inducing in the iron the covered powerful magnetism from a feeble current, adopted the same principle that Schweiger did in his multiplier to actuate a permanent magnet as already explained. Henry besides insulated his wire from the iron and itself by covering it with silk. Prof. Henry had two forms of this multiplying coil according to the battery to be used. On this subject he says: "From these experiments it is evident that in forming the coil we may either use one very long wire or several shorter ones as the circumstances may require; in the first case, our galvanic arrangement must consist of a number of plates, so as to give projectile force (i. e. is an intensity battery.) In the "second it must be formed of a single pair" (i. e. a quantity arrangement.) See Silliman's Journal, vol. 19, page 404.

In the case of the electro-magnetic telegraph, when the intensity arrangement is used on the line, the first form of coil must be used; and this form is to be seen in what is called the "receiving magnet," used in Morse's telegraph. The same form of coil is used in the register magnet of the same telegraph, and it is to Professor Henry's method of making the electro-magnetic coil that the practicability of the Morse telegraph is mainly due.

The result of an experiment with a magnet covered with a coil of the first kind, and using an intensity battery, suggested the fact, which he announced in Silliman's Journal, vol. 19, page 404, 1831, viz:

"The fact that the magnetic action of a current from a trough is at least not sensibly diminished by passing through a long wire, is directly applicable to Barlow's project of forming an electro-magnetic telegraph, and of forming a galvanic coil."

That Prof. Henry's mode of making electro-magnets is properly valued abroad is made sufficiently evident by the following deserved notice from the pen of Mr. Sturgeon himself, who, after alluding to his own discovery of the electro-magnet, thus alludes to the Professor: "The subsequent improved plan of Professor Henry of raising the magnetic action of soft iron developed new and inexhaustible sources of force, which appeared easily and extensively available as a mechanical agent; and it is to the ingenious American philosopher above named that we are indebted for the first form of a working model of an engine upon the principle of a reciprocating polarity of soft iron by electro-dynamical agency." Sturgeon's Annals, vol. 3, page 429.

If the poles of a permanent magnet of the U form be made to approach those of a temporary magnet of the same form, having properly constructed coils, a brief current of electricity may be observed in the wire; the same effect will take place when the poles of the permanent magnet are withdrawn, but the direction of the current induced by the approach of the magnet is the reverse of that induced by the withdrawal of it. The electricity thus excited is termed magneto-electricity, and was discovered by Dr. Faraday in 1831. See Faraday's Researches, &c., vol. 1, page 27.

It is easy to conceive certain mechanical arrangements by which the poles of the magnets may be made to advance towards and recede from each other. A rotary motion has been usually adopted, and the temporary magnets are made to rotate before the permanent magnet, and with any speed. A contrivance has also been added, by which both induced currents are made to take the same direction. Under a rapid motion of the machine the waves of induced electricity are made to succeed each other so rapidly, and in the same direction, as to approach in character to a current. This machine is termed the magneto-electro machine, and its coils can be made for currents of quantity or intensity; it may be made to supply the place of a quantity or intensity battery.

When, in the opening of this affidavit, the date of the suggestion of each of the three kinds of telegraph was given, nothing more was intended than to keep in view from the outset that the idea of the electro-telegraph is not of to-day's growth, but that it dates back nearly to the time when the first notion was formed of the velocity of electricity; that it has been revived from time to time, as the progress of science seemed to warrant an expectation of its realization, until at last we find it practically developed in many systems. The details which follow serve merely to show the steps of that progress so far as it is connected with that idea, and to indicate the benefactors whose research and discovery and invention have furnished the materials which, to a greater or less extent, are employed in every electro-telegraph at present in operation.

No intention is entertained of entering into descriptive details of these classes of telegraphs, but to refer only to such as have a relation in parts or combinations to those under consideration. But it is first required to give authorities for the dates already given in a general way.

It appears that the first telegraph proposed to be operated by common electricity was that of Lesage, of Geneva, in 1774. Muller's Physics, American edition, page 459.

Several others were proposed from that time to 1816; but none are known to have been practically applied. There were two telegraphs proposed soon after the discovery of the decomposing powers of the voltaic current, the first by the German Sœmmering, in the year 1807, whose plan was to make signals by the decomposition of water. See Sturgeon's Annals, vol. 3, page 447. The other was suggested on the same principle by Dr. John Redman Cox, of Philadelphia, Penn. See Thomson's Annals of Philosophy, vol. 7, page 162.

As the above indicated telegraphs have no direct connexion with those under consideration, this brief allusion to them is thought to be sufficient.

As regards electro-magnetic telegraphs the following questions have been propounded to this affiant, viz:

1st. Are you acquainted with the telegraph apparatus claimed by Prof. Morse now in use, its principles and mode of operation?

2d. Are you acquainted with the Columbian Telegraph, its principles, and mode of operation; and if so, do you believe it is the same in principle and mode of operation?

3d. Are there any parts or combinations of Professor Morse's telegraphic apparatus invented or used before the application of said Morse for a patent?

In reply to the first question the affiant states, that he is acquainted with the telegraphic apparatus of Prof. Morse, now in use, its principles and mode of operation.

In reply to the second question he states, that he is acquainted with the Columbian Telegraph, its principles and mode of operation, and he believes it to be different from the telegraph of Prof. Morse, both in principle and mode of operation; and as the grounds of his belief in these respects are the same as those so very ably and clearly set forth in the affidavit of Professor Robert Peters, of the Transylvania University, he begs leave to refer to that paper as containing his reasons for the belief here expressed.

In answer to the third question this affiant states, that he considers Prof. Morse's telegraphic apparatus to consist of the following principal parts, to wit:

1st. A battery or electrometer.
2d. A line of conductors supported on posts.
3d. The ground circuit and plates, or wires.
4th. A receiving magnet and local circuit.
5th. A key or finger stop to make and break circuit.
6th. The register magnet, armature, and pen lever and point.
7th. The ribbon paper.
8th. The train of clock work to draw the paper before the pen.
9th. The alphabet.

1st. As to the battery—the battery used by Professor Morse, as the electrometer of his telegraphic apparatus, was invented by Prof. Grove, 1839. The valuable properties of this kind of battery have already been detailed at page 15, of this affidavit.

2d. From an article by Dr. Steinheil, of Munich, "upon telegraphic communication, especially by means of galvanism," it appears that the line of telegraph for the use of Steinheil's instrument, built in 1837, was nearly eight miles in length, and exposed to all weather and atmospheric changes, and supported by steeples and high buildings part of the route, and on posts and cross-bars, where there were no high buildings. Dr. Steinhiel speaks of many trials having been made up to 1838, to insulate and lay wires under ground without success, and proves the plan to be useless; therefore, as far back as that date, 1838, Steinheil, recommended the "leading of the wire through the air," supported on posts, as the best plan of laying a circuit of conductors.

As evidence of the soundness of this plan it may be stated, that a communication of Charles G. Page, an examiner in the Patent office, and as a stockholder interested in Morse's patent, made to Silliman's

Journal, dated Washington, D. C., July 3d, 1846, contains the following: "I made no further investigation or application of this fact till 1843, when recurrence was had to this feature to solve some difficulties experienced in the projection of a line of telegraph between this place and Baltimore. Ten miles of lead pipe, containing four well insulated wires, had been laid in the ground, and upon trying these wires respectively, making the wire one-half of the circuit, and the lead pipe the other half, with a battery of intensity, a current could be established through any one of the three extra wires. Being consulted by Prof. Morse as to the probable cause of this cross firing, as it was technically called, the solution seemed to me obvious in view of the above experiment. The reasoning was sufficiently plausible to induce Prof. Morse to abandon the undertaking of the pipe, and resort to his original plan of raising the wire upon posts;" a plan recommended by Steinheil in 1838. See Silliman's Journal for 1846. As this method of supporting a circuit on posts was followed by Steinheil in 1837, it is evident it was before Prof. Morse applied for a patent, and is not original with Prof. Morse.

3d. As to the ground circuit with ground plates. It has been shown at page 3 that Watson proved that "dry ground could be made part of a circuit" for machine electricity, and Steinheil was the first to apply the fact to practical use in electro-magnetic telegraphing, in respect to magneto-electricity.

Sturgeon's Annals, vol. 3, 451.

Steinheil was the first to use ground plates for the ground circuit, and to give reasons for the use thereof. It has been stated at page 11 of this affidavit, that Dr. Joseph Henry was the first to use galvanism through a ground circuit. It is evident, then, that this was not invented or discovered by Prof. Morse.

4th. As to the receiving magnet and local circuit—the London Mechanic's Magazine, vol. 28, No. 754, for January 20th, 1838, contains the following in relation to telegraphs:

"It is understood that Mr. Wheatstone, Mr. Cooke, and Mr. Davy, are all acquainted with some means, (whether identical or not,) whereby the carrying on of the communications is rendered totally independent of distance, be it what it may, without the necessity for intermediate renewing stations, whether for ten or ten thousand miles."

So far as Mr. Davy is concerned, his patent, dated July 4th, 1838, contains the following: "It has been found that electric currents, in passing through considerable lengths of metallic circuits, decrease in energy; consequently, where the point from which the communication or signal is given is very distant from the point or place at which the communication or signal is received, it is necessary to have some means of overcoming this difficulty, and it has been proposed to have a number of apparatus at comparatively short distances, and persons to attend thereto to receive and transmit the various communications on from place to place, (in like manner to what is now done in communicating from place to place by telegraph depending on sight,)

til the communications or signals reach the destined place, which is necessarily an expensive means, and attended with greater liability to error in making a communication. Now, by my invention, I so arrange the metallic circuits that at the requisite intervals the apparatus itself will bring into action a succession of wires having their own batteries, which I call renewers. Let it be supposed that it has been determined that the energy of the currents passed through the wires A B C will be sufficient for the purpose to which they are applied for a length of ten miles, and this will be readily ascertained by a galvanometer, which will, by testing the wires at different distances, indicate the extent those wires will transmit electric currents with the degree of energy which will act on the needles employed, with sufficient correctness and quickness, to make or transmit the communications or signals with the degree of velocity desired; and the arrangement is such, that the electric currents which are transmitted from the batteries No. 1 and 2 by the wires A B C, do not pass on to that distant place where the communication is to be received, (if that place be too far distant for such electric currents transmitted through A B C to act with the energy desired,) but further electric currents are obtained and pass through other metallic circuits, brought into action by the working of the apparatus by the person (say at London) who is transmitting the communication or signal. By this means the person making the communication or signal does so direct to the distant place, say from London to Birmingham, without the intervention of other persons, aided only by the requisite apparatus for receiving and transmitting such communications or signals from place to place until they arrive at the ultimate place desired." Here is the general principle of a receiving magnet and local battery; the former takes the place of the galvanometer, and the latter of the renewer. I believe, then, that Prof. Morse is indebted to Davy for the general idea of the method of throwing new circuits into action, and to Prof. Henry for his suggestion as to telegraphs, (see page 16,) for the form of the receiving magnet. I do not believe, therefore, that the system of combination of circuits was known to Prof. Morse at the date of his application for a patent.

5th. As to the key or finger stock—this was proposed as the means of closing and breaking circuit by Ampere, in the electro-magnetic telegraph which he proposed in 1820; Edinburgh Journal of Science, vol. 4, page 173. Prof. Morse is not, therefore, the inventor of the key which was used in telegraphic communication before his application for a patent for the instrument with which it is used.

6th. As to the register magnets—I have shown the origin of the electro-magnet, and Prof. Henry's admirable mode of making them efficient. Prof. Morse, then, did nothing toward the invention or efficiency of the electro-magnets on which his telegraphic system is based, and on which efficiency the practicability of his telegraph depends.

7th. As to the ribbon paper—Steinheil used this in 1837, before Prof. Morse wrote to the Secretary of the Treasury under date of Sept. 27th, 1837, as follows: "Fourth. The record of intelligence is made

in a permanent manner, and in such a form that it can be at once bound up in volumes convenient for reference, if desired." See Vail on Telegraphs, p. 70. Steinheil, in 1838, gave directions how to prepare the ribbon paper in the manner in which he had used it with his recording telegraph in 1837. Prof. Morse, then, was not the first to use such paper for telegraphic purposes.

8th. As to the train of clock work to draw the paper—clock work was used by Dr. Steinheil in 1837, for drawing the record paper before the marking pens and therefore known before Prof. Morse applied for a patent.

9th. As to the alphabet—with Steinheil the alphabet was as original as his idea of recording it was. Prof. Morse does not hint at an alphabet till 1838.

C. B. MOSS.

STATE OF KENTUCKY.

I, M. C. Johnson, a justice of the peace for Fayette county, and State of Kentucky, do certify, that Charles B. Moss this day made oath before me, that the statements of the foregoing affidavit are true to the best of his knowledge and belief; and I do further certify, that he subscribed said affidavit in my presence.

Given under my hand this 30th August, 1848.

M. C. JOHNSON, *J. P. F. C.*

Affidavit of Robert Peters—*Affidavit of Robt. Peters, to wit.*

[For diagram, see original.]

A and B are permanent magnets, fixed to a table or plate; c c is a moveable bar of soft iron, around which are passed the galvanic circuits, by which two currents of electricity or galvanism can be passed alternately from opposite directions, each current converting the bar c c into an electro-magnet, and each changing the poles of that magnet; the effect of one of the currents is to cause a repulsion in the magnet B to the bar c c, and an attraction in the magnet A, whereby the bar c c is drawn and driven to the magnet A. The effect of the other current is to reverse the attraction and repulsion whereby the bar cc is drawn and driven to the magnet B. The motion of the bar cc is made use of in Columbian Telegraph for marking telegraphic signals.

Questions to Robert Peter, professor of chemistry in the medical department of Transylvania University.

1. How long have you been a practical chemist, and has or not your attention been devoted to electro-magnetism, and the application of it to the purpose of telegraphing?

2. Do you understand the principles of Morse's electro-telegraph?

3. Taking the above drawings and explanation as correctly giving the motive power of the Columbian Telegraph, will you say whether or not it is the same in substance with the motive power in Morse's Electro-magnetic Telegraph, or is it substantially different?

Answer 1st. My time has been mainly devoted, with but little intermission, to teaching and putting in practice, experimentally, the principles of chemical science, including those of electricity, magnetism, electro-magnetism, &c., &c., ever since the year 1832; previous to which time, from the year 1820, I may be said to have been rather a learner than a teacher, although I delivered some public courses of lectures on those subjects before the year 1832. As the facts in electro-magnetism and their applications to the purpose of telegraphing have been developed by different discoverers, I have endeavored to make myself acquainted with them, and have represented them to my several classes of pupils.

Answer 2. I believe that I fully understand the principles of Morse's electric telegraph.

Answer 3. Although the different forms of the electric telegraph, which have been invented, are very much alike in the circumstance that their fundamental principles are very much alike, being scientific facts which have been made the common property of the whole world by their discoverers, in scientific journals and other works, and which cannot therefore be made the subject of patents, yet these various telegraphic arrangements differ in their modes of application of these scientific facts or principles, or in the different mechanical contrivances by which the desired effect is produced in them.

The arrangement or contrivance represented in the above drawing is in this view essentially different from that of Morse, in these respects, in particular, viz:

1. The motive power in Morse's instrument is entirely that of the attraction between an electro-magnet and a piece of soft iron; which in the arrangement above drawn and described, the power is produced by the simultaneous attraction and repulsion of permanent magnets, (A and B,) on an electro-magnet (the bar cc), which simultaneous attraction and repulsion each added to the motive power and increase the effective force.

2. In Morse's instrument there is no change of magnetic polarity in the electro-magnet employed, but in that drawn and described above the polarity is changed at every complete vibration of the operative bar (cc.)

3. In Morse's arrangement the vibration of the operating bar is made by the attraction between an electro-magnet and soft iron on the one hand, and the elasticity of a spring on the other; so that a part of the effective battery current which is transmitted along the main line of wire is lost at every motion in overcoming the force of the spring. In the arrangement above described, there is no such loss of power, as the vibration of the operating bar (cc) is caused by reversing the direction of the current around it, thus changing its magnetic polarity, and conse-

quently its position between the permanent magnets A and B. The arrangement above represented appears to me, therefore, not only to be essentially different from that of Morse, but also an improvement upon his, in producing with the same force of battery current along the main line of wire a greater amount of working power.

ROB. PETER.

STATE OF KENTUCKY,
Fayette county.

I, M. C. Johnson, do certify, that the forgoing affidavit was subscribed and sworn to by Robert Peter, before me, a justice of the peace for the county and State aforesaid. Given under my hand this 28th day of August, 1848.

M. C. JOHNSON, *J. P. F. C.*

Affidavit of Charles T. Smith.

Affidavit of Charles T. Smith.

This affiant states, that he is a citizen of the State of Tennessee, residing in the city of Nashville.

That in the summer of 1845 he commenced his telegraphic career at the Magnetic Telegraph office in the city of Washington, on the line of telegraph erected by the United States Government, and then in charge of Prof. S. F. B. Morse, and being at that time the only line of magnetic telegraph in the United States.

That since that time he has been constantly engaged in the business of telegraphing, and that he believes he is familiar with the invention claimed by Prof. Morse, being for the greater part of the time in the daily use of the register and receiving magnet now used by Prof. Morse, with some modification in form and proportion, but of the same principle.

That the said affiant did, in December, 1845, at the request of Alfred Vail, and with the knowledge and consent of Prof. Morse, construct, to be used on the line of telegraph between Harrisburg and Lancaster, Pa., two receiving magnets, said magnets being an improvement, made by Charles G. Page, examiner of patents, on the receiving magnet of Prof. Morse.

That for some time, I think several months, previous to December, 1845, the receiving magnet was in daily use on the line of telegraph between Washington city and Baltimore, with the full knowledge of Prof. Morse and Alfred Vail.

That, at the same time, the self-stopping apparatus was in constant use, in the said telegraph office at Washington, with the full knowledge of Prof. Morse and Alfred Vail.

He further saith, that he is familiar with the invention of Messrs. Barnes & Zook, having used and experimented with same for some months past, and that there is a marked dissimilarity in the application of the electric current to that claimed by Prof Morse.

That, previous to September, 1845, there was used by Prof. Morse

for obtaining his characters a combination of mechanism, consisting of a steel point, used as a pen, a pen lever, armature, and grooved roller, being the same combination as now used; and further, that the alphabet or characters then used were the same as now used by Prof. Morse.

CHARLES T. SMITH.

MORSE, &c.
vs.
O'RIELLY.

Sworn to before the undersigned on the motion for injunction.

THOS. B. MONROE.

August 29th, 1848.

The affidavit of Anson Stager is as follows:

Affidavit of A. Stager.

Anson Stager, of lawful age, on oath says, that he is at present, and has for nearly four months been, manager of the Telegraph office at Cincinnati; that he is practically acquainted with the business of telegraphing, having been for upwards of twenty months last past constantly employed as a telegraphic operator; that he has principally operated with the instrument claimed to have been invented by S. F. B. Morse, but has also used the instrument claimed to have been invented by Barnes & Zook, now used in the city of Louisville, in the State of Kentucky, and is well acquainted with the construction and mode of operation of each of said instruments or machines.

He further states, that in his opinion the form or structure, as well as the principle or mode of operation, of the said instruments or machines, are substantially and mainly different. In Morse's machine temporary magnetism alone is used, in connexion with a lever, armature, and pen point, and a spring which raises the armature from the face of the magnet when the circuit is broken; whereas, in the machine of Barnes & Zook the lever and spring above mentioned are dispensed with.

The grooved roller used in Morse's machine is not used in the machine of Barnes & Zook. The force used in the recording instrument is the combined power of permanent and temporary magnetism, exercised by alternate polarity, in such a manner as to give the motion desired to imprint the characters. The force used to give the required motion in the mutator is, for one direction, the repulsive power of a permanent magnet, acting upon another piece of metal in which like polarity is induced, such repulsion being assisted by a spring. In the opposite motion it is the power of permanent magnetism alone.

ANSON STAGER.

MORSE, &c.
vs.
O'RIELLY, &c.

Sworn to before the undersigned on the motion for injunction.

THOS. B. MONROE, *J. U. S.*

The affidavit of Theodore S. Bell is as follows, to wit:

Affidavit of T. S. Bell.

UNITED STATES, *8th circuit,*
Kentucky district, Jefferson county, city of Louisville, ss.

I, William S. Pilcher, commissioner, in and for said circuit and district, to take affidavits, &c., duly commissioned, qualified, and acting as such, certify, that on this day Theodore S. Bell, of said city, and personally known to me, came before me; and, after being solemnly cautioned and sworn to tell the truth, the whole truth, and nothing but the truth, in the case of S. F. B. Morse and others, complainants, against Henry O'Rielly and others, defendants, pending before the judge of the said district court, to be read on behalf of defendants, being of lawful age, doth depose and say as follows:

I state that, until Henry O'Rielly came out to the West, and took the matter in hand, all attempts to set the telegraph in motion in the West were abortive; the people could not be induced to subscribe for its stock; but, so soon as he took hold of it, stock was subscribed, the business began to wear an encouraging aspect, and lines were rapidly completed, and no difficulty occurred in the money payments of the concern. So soon as O'Rielly had completed his line to the city of St. Louis, although he had several other lines in progress towards the lakes, he, at the urgent request of the people on the line between Louisville and New Orleans, via Nashville, began the preparation to begin, prosecute, and complete such line while yet he was detained by the business of the other line at the city of St. Louis. At a meeting of the stockholders of the Pittsburg and Louisville line, held at Cincinnati, Ohio, early in February, 1848, Mr. Henry O'Rielly received the unanimous recommendation of the stockholders to the favorable regard of the people of the said Louisville and New Orleans line as a constructor of lines of telegraph, recommending him as every worthy of their confidence and support as a man of unblemished integrity and untiring energy. O'Rielly, about the 23d Dec., 1847, began the building of the line of telegraph in the city of Louisville, to run thence to Nashville, Tenn. I was on the 24th of that month out on the Bardstown road, beyond Beargrass bridge, and saw the hands erecting the poles for said line, called, in the charter granted by the legislature of Kentucky, "The People's line." On the 19th of February, 1848, a letter was dated at Gallatin, Tennessee, and addressed to me, stating that said line had then poles erected to within 25 miles of Nashville, and that the poles would be extended into Nashville on the evening of the 22d of that month, but I state that the polemen did not work into Nashville until the 23d of that month. After the wiring was completed to Nashville, it was found that the instruments would not work well, and many were under the impression that it was caused by defects in the said instruments; an occasional message could be sent between Louisville and Nashville, but the line could not be depended on for the transmission of intelligence regularly.

I stated the fact publicly at the time, that the defect was not in the instruments, but was caused by the faulty construction of the lines. The wires crossed and touched so frequently, that I also stated that Mr. Morse's instrument would not work. It was tried when Morse's line was completed, and from the same defect occurring in the construction of his line it did fail to work; finding this to be the fact, Mr. Woolfolk, as the agent of "the People's line," and T. P. Shaffner, agent of Morse's line, entered into an arrangement for overhauling the line between Louisville and Bardstown and correcting these faults; and the error was thus corrected, and the working of the line was greatly improved. I have stated that the O'Rielly line was commenced in Louisville about the 23d Dec. last. I cannot say how much subsequent thereto Morse's line between Louisville and Nashville was commenced. I remember that on the 26th of January, 1848, his agents were engaged in putting up poles in the city of Louisville. I remember the date from the fact that a man was killed on that day while engaged in raising a pole on that line. One set of poles on Morse's line within the city was used on the Frankfort and Nashville route. It was somewhere about the 1st of February that the posts were in process of erection, along the Bardstown road, on this line, and the wiring party commenced some time in March, from which time the difficulties on the line commenced.

Throughout the South, towards Memphis, and in various other quarters, New Orleans, Natchez, and so on, the name of Henry O'Rielly, in connexion with this line of telegraph, imparted to it a degree of confidence that seemed to guarantee its success.

THEODORE S. BELL.

Subscribed and sworn to before me, August 25th, 1848.

W. S. PILCHER, *Com.*

Affidavit of A. L. Peay.

Also the affidavit of Austin L. Peay, taken before me, at the same time and place, to be read in the same behalf in the same case; affiant being personally known to me, of lawful age, and first solemnly cautioned and sworn, deposeth and sayeth:

I state, that under contract with each I delivered poles to the lines of O'Rielly and Morse from Louisville to Nashville. I delivered eight miles of said posts to O'Rielly's line between the 10th and 20th of September, 1847, and between the 10th and 20th January, 1848, I delivered 15 miles of posts to Morse's line. On O'Rielly's line they began setting the posts about the 23d Dec., 1847; and the posts I furnished on the Morse line were not set up till about the 7th or 8th February, 1848. After the two lines were wired between Louisville and Bardstown, the two lines crossed in several places between Louisville and my house, about five miles from the city, and particularly opposite my gate; there the wire was taken from the post and elevated upon a tree. The posts were not set up well; the wind would blow them about so that they might touch on one day and not on another;

they touched opposite my gate; I saw them lying one upon the other there; I don't recollect when O'Rielly began to wire his line; Morse's line began wiring about the 1st of March last.

And further saith not

AUSTIN L. PEAY.

Subscribed and sworn to before me, 25th August, 1848.

W. S. PILCHER, *Com.*

Affidavit of Duane Hall.

Also the affidavit of Duane Hall, taken before me at the same time and place, to be read in the same behalf in the same suit; personally known to me, of lawful age, and first solemnly cautioned and sworn, deposeth and sayeth:

I started from Louisville in the stage on the 19th January, 1848, and ten miles from the city, at Lewis' breakfast house, I overtook the wire party on the O'Rielly line of telegraph to Nashville; I set in with them at that point, and stayed with them and wired on the line until we reached Nashville, which I think we reached on the 22d or 23d of February then following. On the 8th day of February the said wire party struck the Tennessee State line.

And further saith not

DUANE HALL.

Subscribed and sworn to before me, this 25th August, 1848.

W. S. PILCHER,
Commissioner.

Affidavit—R. H. Woolfolk.

Also the affidavit of Richard H. Woolfolk, taken before me, at the same time and place, to be read on the same behalf in the same case. Being known to me, of lawful age, and first duly cautioned and sworn, deposeth and sayeth:

I state that communication was opened on the "People's line" of telegraph from Louisville to Glasgow on Tuesday, February 22d, 1848. The instrument at Glasgow was a simple magnet, and is so yet. The first fluid from Nashville was on the 25th February, 1848, between 10 and 11 o'clock at night. The register would not work, and we could not understand what was said. Monday, March 6th, 1848, communication regularly established, and line declared open, and messages to and from Louisville and Nashville, and congratulations sent and received.

The line continued to work tolerably well until March the 15th, when the instruments were removed for repairs, and all communications closed. Morse's line had then begun to be wired, and crossing O'Rielly's line and touching it in many places, put it out of order An agreement was entered into between myself, as agent of O'Rielly's, and Shaffner, agent for that of Morse, to regulate the difficulty, which

should think, decided advantage in increase of power at all times, and in a perfect control of this instrument when atmospheric electricity would entirely prevent [the] use of the other.

I have examined the Columbian Telegraph itself, and hence speak from knowledge of the instrument.

R. T. P. ALLEN.

STATE OF KENTUCKY,
County of Fayette.

I do certify, that R. T. P. Allen this day made oath that the statements of the forgoing affidavit are true to the best of his knowledge and belief. Given under my hand, as justice of the peace for the county and State aforesaid, this 29th day of August, 1848.

M. C. JOHNSON, *J. P.*

Affidavit of E. F. Barnes.—Affidavit of E. F. Barnes, to wit:

I, Edmund F. Barnes, of the village of Geneva, county of Ontario, and State of New York, having been solemnly sworn, do say:

That I commenced my telegraphic career at the city of Utica, in the State of New York, on or about the first day of April, 1846, on the line known as the New York, Albany, and Buffalo line, then, and as I believe, until now, operated through the means of the instrument claimed by Professor S. F. B. Morse as his invention; that since the month of April, 1846, as aforesaid, with some inconsiderable exceptions, I have been practically conversant with and in daily use of said instrument, and I verily believe I thoroughly understand the manner of the application of said claimed invention to the purposes of telegraphic communication.

That in connexion with Samuel K. Zook, now of the city of New Orleans, I claim to be the inventor of a new and useful improvement for the purpose of telegraphic communication, and I aver that it is different from, and in nowise infringing upon the rights of Professor Morse, or any other person whatever, as I do verily believe.

That Dr. Steinheil, professor of mathematics and natural philosophy of the University of Munich, in Germany, invented an instrument for the purpose of telegraphic communication; said instrument being operated by the power of an electric current, passed about a permanently magnetized bar, which bar in its deflections carried with it a fountain of ink, so arranged that at each deflection there should be made a record upon paper, or other fabric, with which said ink fountains should come in contact.

That combined with the forgoing there was an apparatus for moving the paper, or other fabric, upon which the record was to be made, thus forming an electro-magnetic and recording telegraph; that the instrument claimed by Prof. Morse is operated solely by the power of temporary magnetism, induced in a piece of soft iron by the action of a voltaic or galvanic current, combined with a clock work apparatus for

moving paper, or other fabric, upon which the record is to be made, thus forming an electro-magnetic and recording telegraph. That the Columbian Telegraph is not in its combination like to, nor can it be operated after the manner of Dr. Steinheil's, nor can it be after the manner of the instrument of *by* Professor Morse. That the powers that operate it are a combination of permanent and temporary magnetism, and that the removal of either the permanent magnets or the temporary magnet renders the instrument perfectly powerless and useless.

That the manner that this combination is made in the recording instrument is as follows:

A straight bar of soft iron, around which is a coil of wire, is placed between the approximating poles of two permanent magnets, and stands at a point of indifference, being attracted to neither. Said bar is sustained by means of a carriage. To gain the motion desired, alternate polarity is given to said bar by the mutating currents from two resident batteries, having each one pole, from which is a separate conductor, the other poles of said two batteries being common to one conductor. This motion is governed by the affinity of the bar alternately, for each of the permanent magnets being alternately attracted to each, and also at the same time repelled by the repulsive power of the permanent magnet, for which the bar has not at the time affinity; thus giving at the same time the repulsive and attractive power of both permanent and temporary magnets. That the magnetism induced in said bar need only be sufficient to give it polarity, and the power for making the record will be exerted by the permanent magnets. That from thorough experiment, I am fully convinced that there is no necessity whatever for a relay or local circuit in a telegraphic line, in the manner in which the principle is applied in the Columbian telegraph, on a line of any length whatever, as simple polarity is all that is necessary in the bar, and the permanent magnets will do the rest.

That the mutator or pole changer is used as a matter of convenience, and not of necessity, and is, therefore, wholly unlike, in its object, the receiving magnet used by Professor Morse. That it is a matter of convenience in the Columbian telegraph is evident from the fact, that were it not used for the purpose of obtaining the requisite change of polarity, it would be necessary to have at each station a sufficient battery to operate the entire length of the line, because all batteries would have to be disengaged from the line, except the one at the station where the operation was being performed. That I confidently state, that with the battery necessary in the invention claimed by Professor Morse, to gain the feeble power of his receiving magnet, I can apply the said power to the recording instrument of the Columbian telegraph, and operate with full and sufficient power to make the record in the original or main circuit.

That the mutator is not operated in the manner of the receiving magnet used by Professor Morse, but is operated by the repulsive power of a permanent magnet, acting upon a piece of soft iron, in which like poles are induced; it being an established and undeniable principle in

magnetism that like poles repel, and opposite poles attract. That the electric current is so applied to the mutator of the Columbian Telegraph; that like polarity to the permanent magnet is induced in the piece of soft iron, and that it is repelled from the permanent magnet, and assisted in such repulsion by a spring; and that when the electric current ceases to act, the attractive power of the permanent magnet alone acts, to draw the piece of soft iron towards it again.

That I verily believe that the application of a current of electricity to a piece of soft iron, in such a manner as to produce like polarity with, and in a measure release it from a permanent magnet, and give said piece of soft iron motion, by assistance of a spring; and that placing a soft iron bar between the approximating and opposing poles of two permanent magnets, in such a manner as to give motion by a mutation of poles, are, in their application to telegraphic purposes, principles heretofore entirely unknown to the said Professor Morse.

That upon a line of telegraph known as the New York, Albany and Buffalo telegraph, previous to the 11th of April, 1846, I was in the use of a receiving magnet for the purpose of making and breaking *and breaking* a short local circuit; said receiving magnet being the same, except in form and proportion, as the one now used by the said Professor Morse. That according to the specification under seal from the Patent office, no patent for the receiving magnet was granted until the 11th day of April, 1846.

That I also used, at the same time and place, the self-stopping apparatus, described in said patent of the 11th April, 1846, without any notice to the contrary from the said Professor Morse, the same being, as I believe, known at the time to him to be in use.

That the alphabet then used was identical with the one now claimed by Professor Morse, being formed of a combination of dots, right lines, and spaces, as now combined. That previous to the 11th day of April, 1846, there was used for the purpose of obtaining said combination of dots, lines, and spaces, a combination of mechanism, consisting of a pen point, pen lever, armature, and grooved roller, in the same manner as at present.

E. F. BARNES.

Sworn to before the undersigned, on the motion for injunction.

THOMAS B. MONROE,
J. U. S. D. Ky.

August 29th, 1848.

The following depositions of Cyrus Alger, Francis Alger, and Dr. C. T. Jackson, were read by the complainants as repelling proof herein, and are as follows, to wit:

Deposition of F. Alger.

UNITED STATES OF AMERICA,
Massachusetts district, ss.

I, James B. Robb, clerk of the circuit court of the United States

for the first circuit, Massachusetts district, do hereby certify, that I am acquainted with the handwriting of Geo. S. Hillard, whose name is subscribed to the annexed depositions, and that the signature of Geo. S. Hillard is his handwriting. And I do further certify, that the said Geo. S. Hillard was, at the time of writing the same, a commissioner duly appointed by the said court, pursuant to acts of Congress in cases made and provided, "for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States."

In testimony whereof I have hereunto subscribed my name and affixed the seal of the said court, this first day of June, in the year of our Lord one thousand eight hundred and forty-nine, and in the seventy-third year of the independence of the United States of America.

[L. S.]

JAS. B. ROBB, *Clerk.*

Deposition of Francis Alger, of Boston, in the State of Massachusetts, manufacturer.

The said Alger having been previously sworn, deposes as follows:

I am acquainted with Dr. Charles T. Jackson, of Boston, and have known him upwards of twenty years. Upon his return from Europe in 1832, or 1833, I heard him speak of what he called talking from one place to another by means of electricity, or electro-magnetism, communicated by wires. He said that Professor Morse was a passenger with him on board the Sully, and that they often had scientific meetings and discussions on deck in pleasant weather; and that in one of these the subject of electricity and electro-magnetism was introduced, and that he (Dr. Jackson,) explained to Professor Morse, and the other passengers, a plan of communicating intelligence from one place to another by means of electricity or electro-magnetism. He said that he drew out the plan on the deck of the vessel with chalk. He said that Professor Morse then became very much interested in the subject, and asked a great many questions, which questions showed that before that he had been unacquainted with the elementary principles of those sciences.

FRANCIS ALGER.

Deposition of Cyrus Alger.

Deposition of Cyrus Alger, of Boston, in the State of Massachusetts, manufacturer.

The said Alger having been previously sworn, deposes as follows:

I am acquainted with Dr. Charles T. Jackson, of Boston, and have known him upwards of twenty years. A few days after his return from Europe, in 1832 or 1833, I had a conversation with him on the application of science to the manufacture of iron, from which he proceeded to speak of the subjects of magnetism and electro-magnetism. In the course of this conversation, he told me that Professor Morse was

much interested in the subject of communicating intelligence from one point to another by means of electro-magnetism. In the course of this he said that Professor Morse came out with him in the ship Sully from France, and that he then knew very little about the subject of electro-magnetism, but that during the voyage he (Dr. Jackson,) had explained the subject to him, and that Prof. Morse had become much engaged in it. He added that he thought it perfectly possible to communicate intelligence from one city to another by means of electro-magnetism.

CYRUS ALGER.

UNITED STATES OF AMERICA,
District of Massachusetts, ss.

City of Boston, the thirty-first day of May, A. D. eighteen hundred and forty-nine.

On this date personally appeared before me, the subscriber, a commissioner duly appointed to take depositions in the courts of the United States, the deponents, Cyrus Alger and Francis Alger, whose names are above written, and having been by me carefully examined, cautioned, and sworn to tell the truth, the whole truth, and nothing but the truth, they gave severally the foregoing depositions, and subscribed the same, which were reduced to writing by me. The above depositions are taken to be used in a civil cause now depending in the circuit [court] of the United States, for the district of Kentucky, wherein S. F. B. Morse is plaintiff, and Alexander Bain is defendant, and were taken at the request of the defendant. The testimony of the said deponents is necessary in the said cause, and the cause of the taking thereof is, that they and each of them live at a greater distance from the place of trial than one hundred miles, and out of the said district of Kentucky. I am not of counsel or attorney to either of the parties, nor interested in the event of the said cause. No notification to the adverse party was first made out and served upon him, or any attorney of his, because neither is within one hundred miles of the place of this caption, and I retained the said depositions until this fourth day of June, A. D. 1849, when I now proceed to seal up and direct them to the said court.

GEO. S. HILLARD,
Commissioner, &c., &c., &c.

Deposition of C. T. Jackson.

UNITED STATES OF AMERICA,
Massachusetts district, ss.

I, James B. Robb, clerk of the circuit court of the United States, for the first circuit, Massachusetts district, do hereby certify, that I am acquainted with the handwriting of George S. Hillard, whose name is subscribed to the annexed deposition, and that the said signature of George S. Hillard is his handwriting. And I do further certify, that the said George S. Hillard was, at the time of writing the same, a

commissioner duly appointed by the said court pursuant to the acts of Congress in cases made and provided "for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States."

In testimony whereof I have hereunto subscribed my name, and affixed the seal of the said court, this thirteenth day of May, [L. S.] in the year of our Lord one thousand eight hundred and forty-nine, and in the seventy-third year of the independence of the United States of America.

JAS. B. ROBB, *Clerk.*

Deposition of Charles T. Jackson, of Boston, in the State of Massachusetts, physician and analytic chemist, aged forty-four years.

The said Jackson having been first sworn deposes as follows:

I have been engaged since my boyhood in scientific studies and experiments, and have devoted many years to the subjects of magnetism, electricity, and electro-magnetism, and have constructed nearly every form of magnetic, electric, and galvanic apparatus, and also many pieces of electro-magnetism apparatus; much of my time was also employed in chemical researches and experiments; I went to Europe in the autumn of 1829, for the purpose of completing my medical and scientific education; I continued my scientific studies in Paris, and availed myself of the best opportunities which that city afforded for scientific study; I attended Pouillet's lectures on electro-magnetism at the Sorbonne; I was well acqainted with Pixii, the manufacturer of electric and electro-magnetic instruments, and frequented his shop where they were constructed. I left Havre on my return home in the packet ship Sully, on the sixth day of October, 1832, in company with Samuel F. B. Morse, whom I had not known before, and other gentlemen. I had on board the ship with me an electro-magnet of great power, capable of sustaining more than a hundred weight, and two galvanic batteries, and a large collection of chemical apparatus, and a large quantity of materials for the construction of electro-magnetic apparatus, and also the most recent book upon the subject.

At that time I was familiar with the latest discoveries in electro-magnetism. To wile away the tedium of a long voyage, I was in the habit of introducing into conversation the most interesting discoveries of science; one day I introduced the subject of electricity, giving an account of the most curious experiments in that science, and mentioned that Pouillet had sent a current of electricity through a wire going four hundred times around the academy of the Sorbonne, without the least appreciable interval of time. This seemed to excite the incredulity of the passengers as evinced by their smiles, and in confirmation of the rapidity of the electric current I referred to the experiment of Doctor Franklin, as related in his autobiography, where he describes sending it several miles on a wire without any appreciable loss of time. Mr. Morse was present and asked me where that was stated, and I referred

him to Franklin's autobiography; he said that he had never read that in it. In the course of this conversation, one of the passengers observed that it would be well if we could send news in as rapid a manner, and Mr. Morse said "why can't we;" I instantly replied "we can," and then proceeded to describe numerous methods which occurred to me of telegraphing by electricity, galvanism, and electro-magnetism. First, I suggested a method by counting the sparks in intervals of time in a disjointed wire circuit. Second, by perforating paper by the same means. Thirdly, by use of the galvanic current to effect permanent markings upon paper, between two platina points, placed in contact with chemically prepared paper, the paper being prepared by different chemical methods; among them by staining the paper with turmeric and moistening it with a solution of sulphate of soda, or any other easily decomposable neutral salt, the salt being decomposed by the action of the galvanic current at the points; the liberated alkali changing the turmeric to a dark brown color. The other chemical preparations for the paper were acetate and carbonate of lead, kept moist to be decomposed at the points of the wire, leaving dark stains of reduced lead. I think I proposed various other chemical preparations for the paper, which I do not now distinctly recall. I then observed that we could make telegraphic marks by means of electro-magnetism; when Mr. Morse said "electro-magnetism, what is it; how does that differ from other magnetism?" I proceeded to explain to him how electro-magnetism was produced, and he manifested an entire ignorance on the subject. I proceeded fully and minutely to state the means of producing it by the galvanic battery and coils of wire, showing how soft iron could instantly be rendered magnetic by the galvanic current, and cease to be magnetic when the current was arrested. I described to him minutely the electro-magnet which I have before spoken of, and which was on board at the time, with two galvanic batteries before mentioned; said magnet and batteries having been purchased of Pixii while I was in Paris. I also made drawings of the apparatus, and exhibited them to Mr. Morse, fully explaining them to him. I then proposed to use the electro-magnet as a means for moving a lever beam, connected with the keeper, by alternately magnetizing the magnet by means of the galvanic battery, the lever beam to have a point for puncturing holes through paper, which was to be ruled off from one cylinder to another by clock movement. I stated that this would be perfectly practicable, and that I could shew the movement of the lever beam on the table of the Sully if I could get my apparatus from between deck, where it was stowed, and could get some acid to set the batteries in action. I made a drawing at the time of the apparatus, which I exhibited to Mr. Morse; and, I think, I gave it to him. This seemed to interest Mr. Morse very much, and the next morning he came to the breakfast table and said "I have not slept a wink all night, I have been thinking of what you told me about the telegraph, and I am satisfied it can be done." My reply was that I was sure it could be done; that there was no difficulty about it. The question

now arose as to how the markings could be read, or made to indicate words; I then proposed having the paper ruled in squares, and to indicate numbers by the punctures in those squares, the paper moving from the rollers in even time. I proposed ten numbers. Mr. Morse proposed to reduce the numbers to five, and he proceeded to mark a dictionary with numbers, and then we tried to read them by our system of dots, in which we succeeded very well; the dots representing the place of the punctures.

This was a frequent subject of conversation between us, and Mr. Morse made many suggestions as to the use of the lever beam and the mode of marking. He made notes and drawings in his note book, and was constantly questioning me and keeping my attention steadily fixed upon the subject.

After we arrived in New York Mr. Morse attempted to make an elementary galvanic battery, which consisted of a plate of sheet copper and one of sheet zinc, not more than three inches square, attached to each other by a band of copper more than a foot in length, and asked me if that would do for a simple galvanic battery, such as I had spoken of on board the Sully. I told him it would not answer, and would produce no galvanic current, and told him how it should be made.

After my return to Boston, and having just begun the practice of medicine, I exhibited the experiments of a lever beam, connected with the magnet I had brought home in the Sully. This was in 1834, and in the presence of Mr. Francis Alger, of Boston. The lever beam had a pen in it for the purpose of perforating paper. I also used the two batteries I had brought home in the Sully.

Mr. Morse came to see me in Boston twice subsequent to this. His first visit was some time between 1834 and 1836. His second visit was in 1837, as I think. His object at each of these visits was to talk about the magnetic telegraph, and he proposed at one of the visits that I should put up a telegraph between Boston and Cambridge, which I declined doing from want of means, and because I was searching to find a battery which would keep up a constant current. He asked me who had got a battery, and I referred him to Professor Silliman and Dr. Hare.

The first notice which I saw in the newspapers on the subject was in 1837, as I think, and in the Journal of Commerce, which stated that the idea of the magnetic telegraph first occurred to Mr. S. F. B. Morse in a scientific conversation with Dr. C. T. Jackson on board the Sully, or words to that effect. Subsequently, a newspaper was sent me from New York, stating that the entire credit of the magnetic telegraph was due to our fellow-citizen S. F. B. Morse, or words to that effect.

This occasioned a pretty sharp correspondence between Mr. Morse and myself respecting our relative claims, and I communicated to the editor of the Post the facts in the case, which were published by him in the form of an editorial; in which it was claimed for me to have first suggested the idea of the electric-telegraph on board the Sully.

In one of my letters to Mr. Morse I mentioned to him that I had conceived the plan of printing numbers or letters in actual type by means of electro-magnets and lever beams. This letter was written after I saw the notice above mentioned in the New York papers.

I forgot to mention that I also described, on board the Sully, a method of telegraphing by the sudden ignition of charcoal points, connected with the poles of a galvanic battery, marking the intervals of time between the ignitions. This method I proposed especially for signals for measuring distances for light-houses, and for communicating intelligence to armies, the apparatus being attached to a balloon, or raised to the summit of a lofty marl. The drawings I made of this are still in my possession.

CHARLES T. JACKSON.

UNITED STATES OF AMERICA,
District of Massachusetts, ss.

City of Boston, the twenty-eighth day of May, in the year of our Lord eighteen hundred and forty-nine.

On this date personally appeared before me, the subscriber, a commissioner duly appointed to take depositions in the United States courts, as appears by the certificate hereto annexed, the deponent, Charles T. Jackson, whose name is above written, and being by me carefully examined, cautioned, and sworn to tell the truth, the whole truth, and nothing but the truth, he gave the foregoing deposition and testimony, and subscribed the same, the same having been reduced to writing by me. The above deposition and testimony is taken to be used in a civil cause now depending in the circuit court of the United States, for the district of Kentucky, wherein S. F. B. Morse is plaintiff, and Alexander Bain is defendant, and was taken at the request of the defendant. The testimony of the said Jackson is necessary in the said cause, and the cause of the taking thereof is that he lives at a greater distance from the place of trial than one hundred miles, and out of the said district of Kentucky. I am not of counsel or attorney to either of the parties, nor interested in the event of the said cause. No notification to the adverse party was first made out and served upon him or any attorney of his, because neither is within one hundred miles of the place of this caption, and I retained the said deposition until this thirteenth day of May, A. D. 1849, when I now proceed to seal up and direct it to the said court.

GEORGE S. HILLARD,
Commissioner, &c., &c., &c.

Letter [from] Morse to Dr. Jackson, 28th August, 1837.

The following are the letters and newspaper publications read by complainants as rebutting evidence, to wit:

A.

NEW YORK, *August* 28, 1837.

DR. C. T. JACKSON.

DEAR SIR: I regret exceedingly that you were not in town when I was in Boston a few weeks since. I called to have a long talk with you and tell you the success of my telegraph. I send you an extract from one of the papers here respecting it. I accomplished the marking by means of an electro-magnetic power. Let me hear from you, and tell me where you have been, and what works you have discovered. I hear of you through the Journal of Science, and always good accounts.

In greatest haste, truly yours, as ever,

SAMUEL F. B. MORSE.

B.

Letter from Morse to Jackson, September 18, 1837.

NEW YORK CITY UNIVERSITY, *Sept.* 18, 1837.

TO DR. CHARLES T. JACKSON.

MY DEAR SIR: Yours of the 10th instant, from Bangor, I have received, and I lose no time in endeavoring to disabuse your mind of an error into which it has fallen in regard to the Electro-magnetic Telegraph. You speak of it as "our electric telegraph," and as a "mutual discovery." I am persuaded that when you shall recall the circumstances as they occurred on board the ship, and shall also be informed of the nature of the invention of which I claim to be the sole and original inventor, you will no longer be surprised that your name was not connected with mine in the late announcement of the invention.

I have a distinct recollection of the manner, the place, and the moment when the thought of making an electric wire the means of communicating intelligence first came into my mind, and was first uttered. It was at the table in the cabin just after we had completed the usual repast at mid-day. We were conversing on the recent scientific discoveries in electro-magnetism, and the experiments of Ampére with the electro-magnet. You were describing the length of wire in the coil of a magnet, and the question was asked by one of the passengers, if the electricity was not retarded by the length of wire. You replied, no, that electricity passed instantaneously over any known length of wire, and you then alluded in proof to the experiment by Dr. Franklin who had many miles in circuit near [London in] Philadelphia to ascertain the velocity of electricity, but could observe no difference of time between the touch at extremity and the shock at the other. I then remarked, this being so, if the presence of electricity can be made visible in any desired part of the circuit, I see no reason why intelligence might not be transmitted instantaneously by electricity. You gave your assent that it was possible. The conversation was not averted by this remark of mine from the details of the experiments you were de-

scribing, which was the obtaining of a spark from the magnet, nor was this thought of the telegraph again mentioned until I introduced the subject the next day. While your own mind was during the voyage more occupied with other branches of science, geology and anatomy, the thought which I had conceived took firm possession of my mind, and as you well know the wakeful hours of the night, for I used to report occasionally to you and to several of the other passengers my progress, and to ask you questions in regard to the best mode of ascertaining the presence of electricity. I had *ad*vised a system of signs and constructed a species of type, which I drew out in my sketch-book by which to regulate the passage of electricity, but I had not settled the best mode of causing the electricity to mark; several methods suggested themselves to me, such as causing a puncture to be made in a paper by the passage of a spark between two disconnected parts, &c., which I soon discarded as impracticable. I asked you if there was not some mode of decomposition which could be turned to account. You suggested the following experiment, which we agreed should be tried together, if we could meet for that purpose. It was this, to decompose by electricity Glauber salts upon the paper which was first to be colored with turmeric. This to me seemed so simple and easy a mode that I fell in with the idea, and we agreed to try this experiment as soon as possible after our landing. In my occasional visits to Boston since my return from Europe, I have always endeavored to see you, and have never *saw* you as you well know without introducing the subject of the telegraph, and expressing a wish that the experiment we had talked of might be tried. You were always otherwise busily and necessarily engaged, and the experiment was never tried.

I really do not see the ground of your claim to be a mutual discoverer, even if we had tried the experiment proposed, and it had been successful. This fact would not have constituted you a mutual discoverer, but it might have made you a partner, in a certain sense, in the invention.

The discovery is the original suggestion of conveying intelligence by electricity; the invention is devising the mode of conveying it. This discovery, so far as we alone are concerned, belongs to me, and it must of necessity belong exclusively to me; and if by an experiment, which we proposed to try together, we had mutually fixed upon a successful mode of conveying intelligence, then might we with some propriety be termed mutual or joint inventors. But as we neither have tried any experiment, nor has the one proposed to be tried by you been adopted by me, I cannot see how we can be called mutual inventors. You are not aware, perhaps, that the mode I have carried into effect, after many and various experiments with the assistance of my colleague, Professor Gale, was never mentioned either by you or to you. The plan of marking by my peculiar type, and the use which I make of the electromagnet, was entirely original with me. All the machinery has been elaborated without a hint from you of any kind, in the remotest degree. I am the sole inventor; indeed, had you been aware of these facts, I

am sure you would not have preferred a claim to be a co-inventor in an instrument wholly mine. You say, "I trust you will take care that the proper share of credit shall be given me when you make public your doings." This I have always done, and with pleasure. I have always given you credit for great genius and acquirements, and have always said, in giving any account of my telegraph, that it was on board the ship, during a scientific conversation with you, that I first conceived the thought of an electric telegraph. Is there really any more that you will claim, or that I could in truth or justice give? I have acknowledgments of a similar kind to make to Professor Silliman and Professor Gale; to the former of whom I am under the same obligations, in kind and degree, as to yourself; and to the latter I am most of all indebted for substantial and effective aid in many of my experiments. If any one has a claim to be mutual inventor, on the score of aid by hints, it is Professor Gale, but he prefers no claim of that kind.

I certainly have no cause of complaint because you were never at leisure, when I was in Boston, to try the experiment which we agreed together to try; but you will see, in a moment, that I should have just reason to complain, if, after repeated disappointments in this respect, and after having availed myself of a different method, and one entirely my own, to carry into effect my original invention, you should prefer a claim to partnership in it because we had once conferred together on an experiment never tried. But I need not reason with you, my dear sir; I am sure it is only necessary to present you this statement of the facts in the case, to induce you at once to perceive the injustice you would do me by persisting to prefer any claim to a partnership in my invention. My object in writing you the last time was not only to inform you of my success, which I thought would be gratifying to you as a friend, and the means I employed in effecting my object, but I was in hopes of your testimony to the fact that I invented it, and elaborated on the voyage from France, in 1832. I desired this testimony, that I might successfully claim for our country the priority of invention which is its due, and I cannot but yet hope that you will furnish me with this evidence, to put side by side with that of the other passengers of the Sully, who have furnished me with full testimonials to that effect.

Let me know your intention, for your letter has embarrassed me much, and I will trust to your honor and sense of justice to relieve me from suspense with as little delay as possible.

Believe me, dear sir, as ever, truly your friend and servant,

(Signed) SAM'L F. B. MORSE.

C.

Letter from Morse to Jackson, 7th December, 1837.

NEW YORK CITY UNIVERSITY, *Dec.* 7, 1837.

To DR. CHAS. T. JACKSON.

DEAR SIR: When yours of the 7th November arrived in New York,

I was absent in Jersey, and confined by (severe sudden) illness to my bed for several days. I take the earliest opportunity to reply to it which my various engagements would allow.

It is with the deepest regret, after the attempt I made in my last (letter,) to disabuse your mind of its error on the subject of my telegraph, that I perceive the danger of collision with you to be more imminent than at first. Unless I can succeed in convincing you how entirely without foundation is the claim to be a "mutual inventor," which in your first letter you set up; and still more, unless you retreat from your recent further encroachment in claiming to be "principal in the invention on board the Sully," collision is inevitable, and it will then be impossible, in the present state of my invention, to settle the matter without such an appeal to the laws as must be made public, and which, in whatever way decided, will be attended with consequences of a very unpleasant character to both of us. These results I would avoid if possible; and in hope of adjusting matters privately and amicably, I venture once more to argue the case with you, and will endeavor to convince you that you are under a most serious delusion on this subject, the origin of which delusion I think I can show you.

Your memory and mine are at variance in regard to the first suggestion of conveying intelligence by electricity. I claim to be the one who made it, and in the way which I stated in my letter to you.

You acknowledge that the suggestion was made by one of the company, and not by yourself; and so doubtful are you by whom it was made, that although your memory serves you up to the point of giving it to one or two others rather than to me, yet your memory then fails, and you don't know which of the two it was. Now, sir, it was neither Mr. Fisher nor Mr. Rives who suggested that thought. I suggested it, and in consequence proceeded to found upon it my whole invention. Had not the thought been original with me, I could not have dwelt upon it with any satisfaction. The idea that I had made a brilliant discovery, that it was original in my mind, was the exciting cause and the perpetual stimulus to urge me forward in maturing it to a result. Had I supposed at that time that the thought had ever occurred to any other person, I could never have pursued it; and it was not till I had completed my present invention that I was aware that the thought of conveying intelligence by electricity had occurred to scientific men some years before.

This thought was suggested to my mind by a well known fact called to my memory in your account of a magnetic experiment, a fact of which you say I confessed ignorance, to wit, the experiment of Franklin on the velocity of electricity. If, indeed, you asked the company if they had not read of "Franklin's experiment with 20 miles of wire," and that the reply was from myself that I had not read it, your memory is doubtless correct; for I had not read it, and have not read it, nor can I find, after much inquiry, any one except yourself who ever heard of it; but if you alluded, as I think you did, to Franklin's experiment of about 4 miles at Shooter's hill, this fact was familiar to me probably

before your birth. After having given my suggestion to another, you make me answer it by asking you "why can't we!" And to this question you represent yourself as having immediately given a methodical answer, which implies that the whole idea of an electric telegraph was not then [not] only familiar to you, but that the modes of carrying it into execution were also as familiar as any common chemical experiment. Now, if your memory is good, you must be conscious that this is altogether incorrect; that it is impossible that it should be correct, since the very thought was new to all, and required at least a little time to devise modes of carrying it into effect.

You must be sensible that my suggestion of the possibility of conveying intelligence by electricity was episodical; it did not change the current of your remarks from electro-magnetism upon which you were discoursing; nor did you make a remark concerning a telegraph, until I called your attention to it the next day. As the thought was suggested by me, so it dwelt in my mind. I cherished it as an antidote to ennui, maturing my invention principally in the sleepless hours of the night; with this invention I was so absorbed that I thought of little else, and I was in the habit of reporting progress almost daily to the captain and to several of the other passengers besides yourself. To you, as a man in whom I thought I could confide, I more especially explained my plan of numbers, intervals, type, &c., and the machinery for using them.

I had already invented these, and was reviewing in my mind the various modes of marking at least ten days after my first thinking of the subject, when I consulted you to ascertain if there were not some substances easily decomposed by the simple contact of a wire in an electric state. It was then, and not till then, that you suggested turmeric paper dipt in a solution of sulp. of soda; it was then, and not till then, that you took any interest in the invention. I proposed to you to try this experiment with me when we should arrive at home; and here, sir, is the origin of your error in thinking yourself entitled on this account (to be) a co-inventor. This experiment we were to try together; and if you had tried it, and otherwise aided me in the invention, I should have been willing to share both honors and profits with you. But you very well know that you never tried this, nor any other experiment, in relation to the telegraph, which you ever reported to me. You very well know that you never entertained, until lately, (since my invention has been publicly announced, and since the subject of telegraphs has excited the attention of foreign nations), any interest in it. While I always pressed the subject of the experiment to be tried whenever I met you in Boston, you were full of other engagements, and by your manner of always dismissing it as soon as you could whenever I introduced it, you showed me that you esteemed the matter of little importance. Thus it has been for nearly 5 years. You must be aware, too, that while you considered my invention as impracticable, you did not suggest a single hint of any other mode of applying it. You spoke of my invention of nu-

merals, intervals, levers, type, &c., which I had drawn out in my sketch-book as ingenious, but impracticable; indeed, in your last letter you assert that my mode of permanently recording "is impracticable," and that you "corrected my errors." How you corrected my errors you don't say, nor what mode you proposed as a substitute; if you did propose any, you can doubtless tell what it is. In the letter which I first wrote you, informing you of the public announcement of my telegraph, and requesting the favor of your certificate that I invented [it] on board the Sully in 1832, that I might be prepared against any foreign claimant, a favor which I expected would be granted unhesitatingly, I told you as a friend that I invented a mode of marking by means of an electro-magnet. You would have me understand, by your answer, that, for some 3 years past you had secretly devised the same plan. I allude to this fact, to show you that you did not then conceive yourself to be a mutual inventor, otherwise you would not have allowed three years to elapse without disclosing so important a discovery to your partner in the invention. This is a point that needs explanation. If you considered me a partner in the invention, you were bound, in honor at least, to inform me of it; but if you were contriving secretly to supplant mine, your course is consistent. I shall be loth to adopt the latter supposition, but if I refuse to adopt it, I cannot think you believed yourself to be a mutual inventor.

Another cause of your delusion in this matter is, your entire misconception of the nature of the invention on board the Sully. You seem not to have asked yourself whether any, or how much knowledge of chemical science was requisite to invent an electric telegraph. You describe a variety of experiments in chemical decomposition, and, claiming to be perfectly familiar yourself with chemical analysis, and charging me, not very courteously, with being entirely ignorant, you have persuaded yourself that the argument is irrefutable in favor of your being the principal inventor. You say that you had collected the materials for that purpose, I being wholly ignorant, except as you enlightened me. The invention, you affirm, arose wholly from your material, and "this I would not attempt to dispute." Now, sir, I not only deny that all the materials were furnished by you, but I deny that I am indebted to you for any single hint, of any kind whatever, which I have used in my invention. I go further, sir; I assert that all the consultation I have hitherto had with you on the subject, has had only the effect to retard my invention, by holding out expectation that you would try an experiment which you never tried, but which was necessary to be determined one way or the other, before I could advance conveniently a single step. I do not charge you with intentional neglect; I readily allow your excuses for not trying the experiment; but these excuses do not alter the fact, that your neglect retarded my invention, and compelled me, after 5 years' delay, to consider the result of that experiment as a failure, and, consequently, to devise another mode of applying my apparatus, a mode entirely original with me. This I have done, and now you lay claim to be a

partner in the invention. The only service which could have given you any claim to a share in the invention you neglected to perform, and then you make your demand as if you had performed, and performed successfully.

My invention on board the Sully is mechanical and mathematical; it had no more to do with chemical science than with geology or anatomy. The single scientific fact ascertained by Franklin, that electricity can be made [to] travel on a conductor any distance instantaneously, is all that is needed to know aside from mathematic and mechanical science, in order to plan all I invented on board the Sully, as any one will be able to see from a moment's inspection of my machinery, as then planned.

This machinery consisted, as chiefly you well know, of a system of signs, which were numerals, to be read by intervals; type, and apparatus to arrange the numbers for transmission; a lever, to mark on the register by a closing and breaking the circuit; and a register, moving by clock machinery, to receive the marks at the proper times. So much for the invention at least you very properly concede to me; you allow explicitly in your letter that I invented these. And now, what has chemistry or electro-magnetism to do with any of them? But these, you say, were "wholly impracticable," and as you "pointed out my errors," you perhaps brought your superior knowledge of chemistry and electro-magnetism into the new mode which you suggested, and which was practicable, of course. You can point out, then, doubtless, this practicable improvement, or rather substitute for mine. The apparatus which I invented on board the Sully was gradually matured, and was constructed for and adapted to the use of one wire, or a single circuit.

Now, this you have often asserted to me "to be impracticable," and although you never devised to my knowledge any other method until I informed you of mine with an electro-magnet, you now talk in your letters of using "24 wires" and "24 magnets" and of "marking in real type." Now what have those to do with my invention on board the Sully? The use of 24 wires was probably adopted by you from a hint of mine in the very outset, for it was my first and most natural thought; but having devised what I considered a much more simple and less expensive mode, to wit, using one wire, I almost immediately relinquished the first for my new mode. Whether you derived the hints or not from me it is to me of little consequence, for provided you use nothing that was invented by me upon the "packed of 24 wires," you are at liberty to use them as you please. If you have invented a "telegraph of 24 wires" and a mode of "marking in real type," why do you claim to be a mutual inventor of mine, which is adapted to one wire or a single circuit, and which you at the same time pronounce "impracticable?" Your claim to any share in my impracticable mode is to say the least very singular. Unfortunately, sir, for the sustainment of your claim, the plan which I devised on board the ship, the plan of numerals, type, levers, &c., which you pronounce wholly

"impracticable," and the use of one wire or a single circuit which you pronounce "impracticable," is the very plan I have now in successful operation. This assertion you will perhaps again say is inconsistent with what I have said in a former letter, for you charge me in your last with a strange inconsistency, which you cannot reconcile, because I stated that in consequence of your not testing by experiment a mode of marking which we had devised together, "I had carried into effect another mode entirely original with me." The only inconsistency is in your own misapprehension of my letter. You apply my remark (without any warrant) to the whole invention, whereas my letter limits it expressly to a small part, to that part only which relates to the chemical experiment we proposed to try together, to a mode of marking.

From a review of the whole matter, it is very evident to me that you have been led to project, since your arrival home, a telegraph of your own, founded on the intercourse with me on board the ship, and the free imparting of my invention at that time to you. I will not complain, although under all the circumstances I might complain of your intrusion upon my ground. But you will have to use great circumspection. By this intrusion you have produced a most delicate position of matters. For, by persisting in your unfounded claim, you will not only deprive me of my rights, but you necessarily imply a charge against me of depriving you of your rights. On this point, sir, you will perceive the necessity of treading very cautiously. You will I hope publish nothing which shall implicate me in the slightest degree. A public vindication I should wish to avoid, not less on your own account and the general account of science, than my own; and I shall avoid it, unless you compel me to it by the course you adopt in announcing your own invention. My invention, the invention on board the Sully, has for some time been entered in the Patent office. I have made contracts and formed partnerships in virtue of the right secured by me. Any infringement of those rights will oblige me to take a course which, were I unconnected with others, I might not pursue. For such is my aversion to a difference with any man, especially a man of science like yourself, that I would personally rather suffer the wrong, than by vindicating my rights give any occasion for reflections upon the character of disposition of those whose time and talents ought to be employed in enlarging the bounds of science, and not in settling the merits of mere personal claims. Whatever, therefore, I might personally wish, I am so associated with others that justice will demand a prompt vindication of my own rights if they are attacked.

I have chosen to ascribe your motives in asserting so unfounded a claim to my labors to honest forgetfulness of the circumstances as they occurred on board the Sully, and to a misconception of the nature of my invention. And I trust that no measures on your part will compel me to adopt any other less favorable explanation of your conduct. I, therefore, yet hope that this matter can be settled in private, (I have written plainly for this very end;) and I also hope if you are determined to present another electro-magnetic telegraph to the world, you will do

it without clashing with my prior claim. Hoping to have such an answer as shall clear up rather than increase difficulties:

I am, as ever, in respect for your genius and acquirements, your ob't serv't,

SAM'L F. B. MORSE.

Editorial in Boston Post.

The editorial article in the Boston Post is as follows:

The Observer.—K.

New York, Saturday, February 2, 1839. From the Boston Post. Electro-magnetic telegraph. We are informed that the invention of the Electro-magnetic Telegraph, which has been claimed by Mr. S. F. B. Morse, of New York, is entirely due to our fellow-citizen, Dr. Charles T. Jackson, who first conceived the idea of such an instrument, during his recent voyage from Europe, in the packet ship Sully in October, 1832.

Mr. Morse being his fellow passenger, and having pretended to feel a great interest in the invention, and a desire to participate in the experimental trials of the machinery, Dr. Jackson freely communicated to him and to all the cabin passengers his various plans for effecting the telegraphic communications.

Subsequently Mr. Morse undertook to monopolize the credit of the invention, when Dr. J. wrote him a friendly remonstrance, to which he received a long sophistical reply of a very unsatisfactory character. This was followed by a severe reprimand from Dr. J., with a detail of all the circumstances of the invention, and of the conversation which took place on board the Sully, when an impudent answer was returned, giving Dr. J. to understand that Mr. Morse had taken out a patent for the invention, and was the only inventor acknowledged by the law, and cautioning him as to his proceedings. In the mean time Mr. Morse was informed that if he pretended to publish an account of the instrument in the American Journal of Science, as he had attempted, that a disclaimer would follow it; whereupon he withdrew his article. The origin of the idea of the new telegraph, as above stated, can be proved by a number of the passengers on board the Sully at the time; and Mr. Rives, the American ambassador to France, Mr. Fisher, of Philadelphia, and Capt. Pell, of the Sully, having listened to the convention, will recollect that Mr. Morse acknowledged himself wholly unacquainted with electro-magnetism, and that Dr. J. freely informed him of every particular discovery applicable to the case.

Publication signed S. F. B. Morse.

The publication signed Samuel F. B. Morse, is as follows, to wit:

I.—*From the Boston Morning Post—The Electro-magnetic Telegraph.*

Mr. EDITOR: In the month of January last, during my absence in

Europe, an article appeared in your journal, and was thence copied into other papers, claiming for Dr. Charles T. Jackson, of Boston, the invention of my Electro-magnetic Telegraph.

Dr. Jackson, in a letter to my brother, acknowledges himself the author of that article, and has thus made himself responsible for its calumnious statements. He states that he invented the telegraph on board the packet ship Sully, on her voyage from Havre to New York, in the autumn of 1832, and for the truth of his assertions he appeals to Captain Pell, of the Sully, and to our fellow passengers, the Hon. Mr. Rives, of Virginia, and Mr. Fisher, of Philadelphia. These gentlemen have heard this claim of Dr. Jackson with astonishment. I have a letter from each of them, asserting, unequivocally, my exclusive claims to the invention, and one of them, at least, has expressed not only surprise but indignation at the reference made to him by Dr. Jackson; for, as he observed, it was notorious that the telegraph was the subject of conversation at almost every meal during the latter part of the voyage; that I was spoken to and spoken of as the inventor, and that, too, constantly and in the presence of Dr. Jackson, who put forth at that time no claim to any participation whatever in the invention.

Dr. Jackson in his article in the Post seems desirous of leaving the impression that he must have been the inventor of the telegraph, because he was so much better acquainted than myself with chemistry and electro-magnetism. I have no disposition to deny Dr. Jackson's superior knowledge of these branches of science; but, every one acquainted with my machine knows very well that it did not require any profound knowledge of the sciences to invent it. I needed only to know such facts as are contained in the elementary treatises on the sciences. It is true that these facts were recalled to my memory in conversation with Dr. Jackson, as also with others of my fellow passengers. In a particular instance I inquired of Dr. Jackson if there were not some substances which would be so easily decomposed by the electric fluid, that simple contact with a wire in an electric state would show a mark. I wished to use it to mark the signs I had planned to convey intelligence. He suggested that if turmeric paper, dipped in a solution of sulphate of soda, were brought in contact with my wire when in an electric state, the salt might be decomposed, and leave a brown mark on the paper. I was pleased with the suggestion, and proposed that on our arrival we should try the experiment together. Accordingly, on every visit to Boston, for several years afterwards, I called on Dr. Jackson, and proposed trying the experiment; but he always made his numerous and important engagements a reason for postponing it, and whether he has tried the experiment, to this day I know not. It is sufficient for me to say, that it is not the mode of marking which I use in my machine; and I am at a loss, therefore, to conceive on what ground Dr. Jackson can claim to be a participator in my invention, for certainly he did not suggest any one of its mechanical movements, and every one acquainted with my telegraph knows that its merit is entirely mechanical.

If further evidence were needed of the absurdity of Dr. Jackson's claim to my invention, it may be found in the correspondence he had with me on the subject in 1837, in which he pronounces the essential parts of my invention, which are now in successful operation, "impracticable," and proposes a mode of his own, not only bearing no resemblance to mine, but so awkward and complicated as to convince every one who has read his letter that he could not have been the inventor of my telegraph.

With respect, your obedient servant,

SAMUEL F. B. MORSE.

Editors who have copied Dr. Jackson's article, are requested to publish this reply.

New York city University, May 14th, 1839.

The following is the agreement of counsel relative to the foregoing letters and newspaper publications, to wit:

Agreement of counsel.

Circuit court of the United States, district of Kentucky. In chancery.

SAMUEL F. B. MORSE, Alfred Vail, and Francis O. J. Smith, complainants,
against
HENRY O'RIELLY, Eugene L. Whitman, and W. F. Hastings, defendants.

It is stipulated that the copies of letters and correspondence, and other articles hereunto annexed, may be read in evidence on the trial or hearing of this cause by either party to this suit, without further proof, or producing the orignals; and it shall be admitted that the original letters, of which those marked A, B, C, are copies, were respectively written by Professor Morse to Dr. Charles T. Jackson, of Boston; and that the same were mailed to the said Charles T. Jackson by Professor Morse at or about their dates respectively; and that the same were received by the said Jackson by due course of mail within a few days after their respective dates; and that said copies are true copies of the original letters; and that the original letters, of which those marked D and E are copies, were written by Dr. Charles T. Jackson, of Boston, to Professor Morse, at their respective dates; and were at or about their respective dates mailed by said Jackson to said Samuel F. B. Morse, and were received by the said Morse within a few days after their respective dates; and that said Jackson and Morse did not have any other direct correspondence with each other; and that said copies are true copies of said original letters; that an original letter, a copy whereof is hereunto annexed, and marked F, was written by Sidney E. Morse to the said Charles T. Jackson, at the date of said letter, marked F, and was at or about its date mailed by the said Sidney E.

Morse to said Charles T. Jackson, and was in due course of mail received by said Jackson within a few days thereafter; and that said copy is a true copy of the original letter. That an original letter, of which the letter hereunto annexed, marked G, is a true copy, was written by Dr. Charles T. Jackson, of Boston, to Sidney E. Morse, of New York, at the date prefixed to said letter, and that the same was mailed by the said Jackson to the said Sidney E. Morse at or about its date; that the same was in due course of mail received by the said Sidney E. Morse within a few days thereafter. It shall also be admitted that the article hereunto annexed, headed "the Observer," and marked H, is a true copy of an original article furnished by said Dr. Charles T. Jackson for the Boston Post, and was published in that paper as editorial January 10, 1839, and is the same article referred to in the letter of Dr. Jackson to Sidney E. Morse, marked G; and that said letter and the article marked H, may be read in evidence without further proof; that said article was copied from the Boston Post into the New York Observer, under the date of February 2d, 1839; and it shall be admitted that the article marked I, and purporting to be taken from the Boston Morning Post, and signed Samuel F. B. Morse, dated May 14, 1839, is a true copy of an original article furnished by said Samuel F. B. Morse to the editor of said paper; and that the same was published in that paper about the date thereof; and that said article may be read in evidence in this cause without further proof. That the printed article hereunto annexed, headed "the Observer," and marked K, that part of it which follows the matter which is contained in the article marked H, and purports to be a reply to said article H by said Sidney E. Morse, may be read in evidence without further proof; that part of said article, however, which is the reply of Sidney E. Morse to the article H, as well as all other papers above named, shall only be read, subject to all just legal objections as to their relevancy or competency as evidence in this cause; but no objection shall be taken to the insufficiency of the proof thereof, or to the mode in which the same are proved under this stipulation; all further proof of their authenticity, or of the facts herein stipulated to be admitted, being hereby dispensed with. It shall also be admitted, that the paper hereunto annexed, and marked L, is a true extract of a memorandum and letter contained in the letter book of Samuel F. B. Morse; and that the same may be read in evidence in this cause without the production of the said letter book; and that the said letter and memorandum is in the handwriting of Professor S. F. B. Morse.

It is further stipulated that the depositions taken, or to be taken, in this cause, whether under commission or otherwise, by either of the parties, may be transmitted to Frankfort, to the clerk of this court, by either party, by such mode of transmission as he shall see fit to select, without sending the same by mail or special messenger; that no preliminary proofs as to the mode of transition shall be requisite to entitle the same to be read in evidence, and the reading of said deposition shall not be objected to by either party on the ground that the mode

of transmission has not been in accordance with any statutory provisions, or with any of the rules or practice of this court.

That no objection shall be taken to the manner of taking any deposition without notice of taking to the opposite party; nothing herein contained, however, shall be construed as precluding either party from making application to the court for leave to cross examine witnesses, or to give further evidence, if further evidence shall be deemed necessary; such application, *hower*, shall be passed upon by the court upon its merits, and shall be granted or refused upon its merits, irrespective of any thing contained in this agreement. It is further stipulated that the copies of letters and articles enumerated in this agreement may be read in evidence in the cause pending in the circuit court in Tennessee, between the same parties, under the terms and conditions herein provided for.

Dated Sept. 12, 1849.

S. P. CHASE,
For defendants.
E. FITCH SMITH,
Of counsel for complainant, Sam'l F. B. Morse.

The following proceedings were had in this cause upon an attachment against O'Rielly and others, to wit:

Order for attachment.

At a circuit court held for the 8th circuit and Kentucky district, at the October term thereof, in the year 1848, to wit, on the 17th day of October, came the complainants, by their counsel; and on their motion, upon affidavits read and filed, it is ordered, that an attachment be issued returnable forthwith against Henry O'Rielly and E. L. Whitman, two of the defendants, and E. F. Barnes and William R. Church, servants, agents of the defendants, for them to answer the charge by the complainants of a contempt committed by them, O'Rielly, Whitman, Barnes, and Church, in disobeying and violating the injunction awarded herein by the district judge, at his chambers, and contained in the writ which issued accordingly, and was executed as it appears by its return.

Whereupon the following attachment was issued, to wit:

Attachment.

The United States of America, to the marshal of the Kentucky district, greeting:

[L. S.]

You are hereby commanded to attach Henry O'Rielly, E. L. Whitman, E. F. Barnes, and William R. Church, if they be found within your bailiwick, and them safely keep so that you have their bodies before the judges of our eighth circuit court of the United States of America, in and for the Kentucky district, at the Capitol, in Frankfort, forthwith to answer us as well of a certain contempt by them to us

offered, as upon those things which shall then and there be objected against them; and have then there this writ.

In testimony whereof Roger B. Taney, esq., chief justice of the Supreme Court of the United States, hath caused the seal of our said court to be hereunto affixed, this 17th day of October, 1848, in the 73d year of our independence.

Attest: JNO. H. HANNA,
C. C. C., K. D.

Endorsement.—This attachment is issued for a contempt in disobeying and violating the injunction awarded by the district judge of the United States, district Kentucky, at his chambers, in the case of Sam'l F. B. Morse, &c., vs. Henry O'Rielly, &c.

Attest: JNO. H. HANNA,
C. C. C., K. D.

Marshal's return, to wit:

Executed, E. F. Barnes; Henry O'Rielly, E. L. Whitman, and William R. Church, now not found.

Oct. 19th, 1848.

R. N. LANE, *D. M.*,
For JOHN LANE, *M. K. D.*

Order upon hearing of attachment.

And afterwards, to wit, at a subsequent day of the October term aforesaid of said court, to wit, on the 21st day of October, 1848, came the complainants, by their counsel, and the marshal having returned the writ of attachment awarded herein at the present term against Henry O'Rielly and E. L. Whitman, defendants to their bill, and E. F. Barnes and William R. Church; executed upon the said E. F. Barnes, and not found as to all the other defendants thereto, and having accordingly produced the body of him, E. F. Barnes, in court, the said E. F. Barnes was heard in answer to alleged contempt; and the proof of the complainant having been heard, the matter was argued by the counsel of the parties; but the court not being fully advised took time.

And at a subsequent day of the October term aforesaid of said court, to wit, on the 23d of October, 1848, came again the complainants, by their counsel, and the said E. F. Barnes in custody, &c., and the said Barnes was further heard in his defence; and the matter was again argued by his counsel and the counsel of the complainants; but the court, not being fully advised, took time.

And at a subsequent day of said October term, to wit, on the 24th of October, 1848, came again the complainants, by their counsel, and the said Barnes in the custody of the marshal, and the matter having been fully considered:

Whereupon, it seems to the court that the operations of the tele-

graph of the defendants, O'Rielly and others, in the writ of injunction mentioned by said Barnes, in the transmission of intelligence from the city of Louisville, within the district of Kentucky, to Nashville, without the district, by making at that place the record thereof in the telegraphic characters indented upon the paper, off which it was put into the manuscript for the correspondent, was a palpable violation of the injunction. And that his operations of the same telegraph in receiving intelligence from Nashville at Louisville, in and by the sounds made by the same action of the telegraph which, in its regular operation, would have made the record in the telegraphic characters indented upon the paper, and therefrom putting the same into manuscript for the correspondents, was a mere evasion of the injunction, and substantially a violation thereof, and of the vested rights of the complainants. And

It seems to the court, on the proofs and the answer of the said Barnes, that the apparent denial that he acted as servant or agent of the defendants is a mere evasion of the import of these terms as employed, and properly employed, in the writ of injunction and in all such proceedings.

It is considered that his confederation and combination, apparent in the proof with the defendants to the complainant's bill, in the devising and announcing modes of evading the injunction and rendering the judgment of the court ineffectual, his being afterwards found in the possession of their telegraph at Louisville, operating in that city with one of his co-defendants in the attachment, in his employment, in the absence of the defendants to the bill, his recognition elsewhere on the line, his receiving compensation for these operations, and so conducting their business in the usual mode, was acting under the authority of the defendants, and as their servant or agent; and that his operations having been prohibited by the writ he had read, he did thereby violate the injunction, and in a character and mode which renders him subject to this proceeding.

It is therefore considered by the court, that the said Barnes is guilty of the contempt wherewith he is charged, and that the complainants have a right to be secured against his further violation of their rights.

It is therefore ordered, that the said E. F. Barnes may execute bond to the complainants in the same penalty in which the complainants were required to execute bond to the defendants in obtaining the order of injunction, with one or more sufficient securities, with condition to be void if the said Barnes shall not, by himself or another, in anywise violate the injunction in said writ according to the sense as above in this order declared, otherwise to remain in full force; and on his refusing to do so he shall be committed to the jail of the county of Franklin, there to remain until he shall have executed such bond, or until the next term of this court, or its further order.

It is further ordered, that the said E. F. Barnes pay to the complainants their costs in this proceeding expended.

Whereupon the said E. F. Barnes, with Theodore S. Bell, W. N.

Haldeman, and R. H. Woolfolk, his securities, executed a bond in the penal sum of five thousand dollars, payable to the complainants, with the condition above described; and having paid the costs above assessed against him, he is discharged.

Order for alias attachment.

And at a subsequent day of said October term, to wit, on the 6th of November, 1848, came the complainants, by their counsel, and on their motion an alias attachment is awarded against Henry O'Rielly and Eugene L. Whitman, defendants herein, and William R. Church, servant and agent of the defendants, upon the order made herein on the 17th ultimo, returnable here on Thursday next.

Whereupon the following alias attachment was issued, to wit:

Alias attachment.

[L. S.] The United States of America, to the marshal of the Kentucky district, greeting:

You are hereby again commanded to attach Henry O'Rielly, and Eugene L. Whitman, and Wm. R. Church, if they be found within your bailiwick, and them safely keep, so that you have their bodies before the judges of our eighth circuit court of the United States of America, in and for the Kentucky district, at the Capitol in Frankfort, on Thursday next, to answer us as well of a certain contempt by them to us offered, as upon those things which shall then and there be objected against them; and have then there this writ.

In testimony whereof Roger B. Taney, esq., chief justice of the Supreme Court of the United States, hath caused the seal of our said court to be hereunto affixed, this 5th day of November, 1848, in the 73d year of our independence.

Attest: JNO. H. HANNA, *C. C. C., K. D.*

Endorsed—This attachment is issued for a contempt in violating the injunction awarded by the district judge of the United States, K'y district, at his chambers, in the case of S. B. F. Morse, &c., vs. Henry O'Rielly, &c.

Att: JNO. H. HANNA, *C. C. C., K. D.*

Marshal's return, to wit:

Not found; no inhabitants. Nov. 8th, 1848.

C. G. MORRIS, *Dep. M.*

Order for pluries attachment.

And at a subsequent day of said term, to wit, on the 13th of November, 1848, came the complainants by their counsel; and, on their motion, pluries attachments are awarded herein against Henry O'Rielly and Eugene L. Whitman, defendants herein, and William R. Church,

servant and agent of the defendants, upon the order made herein on the 17th ultimo, returnable here on the first day of the next term.

Let the writ be endorsed, that the marshal may admit the defendants to bail upon their respectively giving bond, with one or more sufficient securities, in the penalty in the case of Henry O'Rielly of $5,000, and in the cases of Whitman and Church, each, in the penalty of $1,000, with condition that they appear on the first day of the next term.

Whereupon the following pluries attachment was issued, to wit:

Pluries attachment.

[L. S.] The United States of America, to the marshal of the Kentucky district, greeting:

You are hereby again commanded to attach Henry O'Rielly and Eugene L. Whitman, if they be found within your bailiwick, and them safely keep, so that you have their bodies before the judges of our eighth circuit court of the United States of America, in and for the Kentucky district, at the Capitol in Frankfort, on the first day of our May term next, to answer us as well of a certain contempt by them to us offered, as upon those things which shall then and there be objected against them; and have then there this writ.

In testimony whereof Roger B. Taney, esq., chief justice of the Supreme Court of the United States, hath caused the seal of our said court to be hereunto affixed, this 25th day of November, 1848, in the 73d year of our independence.

Attest: JNO. HANNA, *C. C. C., K. D.*

Endorsed—The marshal may admit the defendants to bail upon their respectively giving bond, with one or more sufficient securities, in the penalty in the case of Henry O'Rielly of $5,000, and in the case of Whitman in the penalty of $1,000, with condition that they appear here on the first day of the next term.

Att: JNO. H. HANNA, *C. C. C., K. D.*

(Marshal's return, to wit:)

No inhabitants, and not found. May 15th, 1849.

J. H. JETT, *D. M.*

Order discharging attachment against O'Rielly.

And afterwards, to wit, at the May term of said court, to wit, on the 15th day of June, 1849, on the matter of the charge of contempt, it seems to the court that the attempts were committed, and in such manner that he, the said O'Rielly, is responsible therefor; but in consideration of his disclaimer of any intention on his part that what was a violation of the injunction should be committed, and of the proceedings which have been had, it is ordered that he, the said Henry O'Rielly, be discharged, on his payment of the costs of these proceedings.

The following are the affidavits and papers read on the application and trial of the above attachment against E. F. Barnes, &c., to wit:

Affidavit of T. C. McAfee.

Affidavit of Tho. C. McAfee, to wit:

UNITED STATES OF AMERICA,
8th circuit, Kentucky district, ss.

This day Thomas C. McAfee came personally before me, at my office in the city of Louisville, in said circuit and district, W. S. Pilcher, commissioner of affidavits, &c., duly commissioned, and acting as such, and made the following affidavit, to be read on the part of complainant in the suit pending in the 8th circuit and Kentucky district court, wherein S. F. B. Morse is complainant, and Henry O'Rielly and others are defendants; and doth depose and say, on being first duly cautioned and sworn to tell the truth, the whole truth, and nothing but the truth, that he is, and has been for several months, employed in the office of Morse's telegraph in the city of Louisville, Ky., from which proceed the lines of telegraph to Frankfort, Ky., and to Nashville, Tennessee, as an operator on said lines; that in the same building is the office established by Henry O'Rielly, called the People's Line office, in which were employed E. L. Witman and W. F. B. Hastings, upon the lines going from said office to Cincinnati and to Nashville; and on which, prior to the injunction granted by the district judge of Kentucky, there was used the instrument called the Columbian Telegraph, and claimed to be the invention of Messrs. Barnes and Zook. Affiant was often in said People's Line office before the said injunction, and has been in it frequently since. That the said Columbian instrument continued to be used in the said office until the service of the writ of injunction in the case of Morse, &c., vs. O'Rielly, &c., when that part of it used for the making of marks upon paper was dispensed with, which part consisted of the clock work for moving the paper, the paper itself, and the pen point.

In other respects, the instrument and the apparatus by which it was worked, was left the same as it was exhibited to the judge on the hearing of the motion for the injunction. Affiant further states that the said instrument and apparatus have continued to be used, and are yet used, for the purpose of sending and receiving messages upon the line constructed by the said O'Rielly, to and from Nashville, Tennessee. No change having since the injunction been made in the apparatus, for as in the mode of sending telegraphic messages on said line to Nashville, and the change in the mode of receiving messages from Nashville being in the dispensing with the marks upon the paper, the operator determining the messages by the sounds produced by the end of a moveable arm striking against a piece of brass permanently fixed. This arm is mounted upon a carriage fixed to or upon a piece of soft iron or electro-magnet, which plays between the two permanent magnets in the same manner as in the instrument shown on the aforesaid hearing before the district judge. The motion on the piece of soft iron, or electro-magnet, is produced by the action of two local, or as termed by Mr. Barnes, resident batteries, and circuits connected with the main

line by the same mutator, which was exhibited on the hearing aforesaid.

Affiant further states that E. L. Witman, who once operated in said office, has gone, as he is informed, to Nashville, and is now engaged in the office there. That E. F. Barnes, the same who testified on the hearing aforesaid at Frankfort, and who claims to be one of the inventors of said Columbian Telegraph, commenced operating in the said office when the said injunction was served, and is yet operating therein, in sending and receiving messages to and from Nashville.

Affiant has often conversed with said Barnes upon the subject of the injunction aforesaid, and said Barnes has repeatedly said to affiant that he has, since the injunction, sent and received messages to and from Nashville on said line of O'Rielly, as well as before the injunction; and said Barnes has often said that he had no difficulty whatever in receiving said messages by the sound, and that it was quite as good a method as that of the marks upon paper.

Affiant further states that one Church, whose christian name is not remembered, is engaged in the said office of O'Rielly, in Louisville, and assists in the business of sending and receiving messages on the said line of O'Rielly, to and from Nashville. Affiant verily believes that said Church and Barnes are both in the employment of said O'Rielly. He states that the said office, and the operators thereof, are the same mentioned in the advertisement of the People's line to New Orleans and to Memphis, which was published in the Louisville Courier after the injunction.

Affiant further states that several, he believes as many as half-a-dozen, messages have, since the service of the injunction, been brought to the office of Morse & Co., in which the affiant operates, by the said Church, which purported to have been received at the said office of O'Rielly, on the "People's line" from Nashville, or points beyond, for transmission upon Morse's line to Maysville, or to others points to which that line extends. Affiant annexes hereto as part of his affidavit three of the captions of said messages as received at said office of Morse, to be transmitted as aforesaid, viz., two on the 1st October, 1848, and one on the 4th October, 1848, on all of which he has written his name, and placed the date of each upon the back thereof as received at said Morse's office, and has pasted them together, and upon this sheet of his deposition, that the same may appear as part thereof.

In each case of a message received from O'Rielly's office aforesaid to be transmittted by that of Morse, when the pay for it was to be at the place to which it was directed, the operator of Morse paid the operator of O'Rielly's line for the cost of its transmission to Louisville by the latter line. And further saith not

THOS. C. McAFEE.

I, William S. Pilcher, commissioner aforesaid, certify, that the foregoing affidavit of Thos. C. Afee was reduced to writing by me in his

presence, on the 14th day of October, 1848, at my office in the city of Louisville. That said witness is of lawful age; that he is personally known to me that he is a credible person; that he was duly sworn as stated in the caption; and that I am not of counsel or of kin to any of the parties of the suit mentioned in the caption in which it is to be read, and that I have no interest whatever in the matters of this suit. Signed 14th October, 1848.

W. S. PILCHER,
Com. U. S., K. D., 5th circuit.

The following are the captions to messages, to wit:

People's line, Louisville, Nashville, and New Orleans Telegraph, Louisville office, Telegraph building, 2d story, 3d street.

The following was received at this office at 9 o'clock, 3 minutes, p. m., dated Memphis, Oct. 4, 1848. M. Genl. Wm. Johnson, Great Crossings, Scott Co., mail at Frankfort, Ky.

People's line, Louisville, Nashville, and New Orleans telegraph, Louisville office, Telegraph building, 2d story, 3d street.

The following communication was received at this office at 4 o'clock, 24 minutes, p. m., dated New Orleans, Sep. 27, via Memphis, Oct. 1, 1848. Mr. P. Scott, Lexington, Ky.

People's line, Louisville, Nashville, and New Orleans telegraph. Louisville office, telegraph building, 2d story, 3d street.

The following communication was received at this office at 4 o'clock 25 minutes, p. m., dated New Orleans, September 27, via Memphis, October 1, 1848. Mr. Robert H. Hamilton, Lexington, Kentucky.

Affidavit [of] H. W. Faxon.

Affidavit of Henry W. Faxon, to wit:

Affiant says he is a practical operator in telegraphing; is a resident of Nashville, Tennessee, and [is] employed in the telegraph office in said city, of Morse & Co.

He further states, that previous to the late proceedings at Frankfort, Kentucky, on the motion of Morse, &c., against Henry O'Rielly and others, there was used in the city of Nashville, upon that end of the line of telegraph from Louisville, constructed by Henry O'Rielly, and commonly called the "People's Line," an instrument called the Columbian Telegraph, which recorded the messages from Louisville by marks of dots and dashes imprinted upon paper; that the said instrument was worked by a combination of circuits of electricity, the main circuit extending from Louisville to Nashville, and connected in the office at Nashville with resident or local circuits, which acted alternately upon the register or marking instrument which imprinted the marks upon a ribbon of paper as it was carried through the instrument

by a weight and clock work. The connexion between the circuits was by what was called a mutator, in which, and in the register, were permanent magnets in the form of a horse-shoe, and moveable pieces of soft iron made electro-magnets by the passage of electric currents through the coils of wire around them. Affiant often saw the said apparatus in operation in the office in Nashville, of the "People's Line of Telegraph" aforesaid, previous to the date of the injunction granted in the district of Kentucky, in the proceedings aforesaid, which injunction affiant has read in the newspapers.

Affiant further states, that he has been in the said "People's Line" office in Nashville since the issuing of the injunction aforesaid, and seen the operations performed in receiving messages from Louisville. The said Columbian was still used without any change, and the said messages were recorded as before the injunction, in the manner above described.

Affiant, on the 10th day of October, 1848, (since the injunction,) was in the said office and witnessed the recording of a message from Louisville by the apparatus above described, in the production of which record the motive power was the electric current upon the main line of wire from Louisville, generated by the battery there, and broken and connected by the operators in the office of said line at that place. And affiant does verily believe that, in operating the said "People's Line" since the said injunction, no change has been made in the mode of receiving or sending messages at and from said Nashville office used previous to said injunction, and that the apparatus aforesaid has been and is yet habitually used. Affiant further states, that the said "People's Line" was constructed by Henry O'Rielly, and the office aforesaid, in Nashville, established by him. That the operators in said office are in the service of the said O'Rielly and his associates; their names are P. P. Peck and Eugene L. Whitman. The drawing annexed is made a part of the foregoing statement or affidavit, that the same may be more intelligible.

HENRY W. FAXON.

This day appeared before me, W. K. Turner, judge, &c., Henry W. Faxon, and made oath that the statements made in the foregoing affidavit are true to the best of my knowledge and belief.

HENRY W. FAXON.

Sworn to and subscribed before me, this 11th day of October, 1848.

WM. K. TURNER, *Judge, &c., &c.,*

STATE OF TENNESSEE.

I, Thomas T. Smiley, clerk of the circuit court of Davidson county, do certify, that W. K. Turner, whose name is subscribed to the foregoing certificate, is judge of the criminal court of Davidson county, in said State, the same being a court of record, duly commissioned and qualified.

In testimony whereof I hereto subscribe my name and affix the seal of said court, at office in Nashville, the 12th day of October, A. D. 1848, and in the 23d year of American independence.

[L. S.]

THO. T. SMILEY.

Affidavit [of] E. F. Barnes.

Enmund F. Barnes respectfully answering to the alleged contempt of court in the case of Morse, &c., vs. O'Rielly, &c., in the circuit court of the United States for the district of Kentucky, says, that in nothing which he has done did he intend any disrespect to the order of this honorable court, or any violation of the rights of the complainants, as shown by the writ of injunction. This writ he had seen. He was perfectly satisfied that the injunction did not include any mode of operation that did not mark or register, and this he thinks is following the patent of complainant Morse.

It is true that he did operate with an instrument very much such as described in the affidavit of Thomas C. McAfee, filed herein. That he received messages by this instrument, and sent them by it; but in so doing he thought he was not violating the injunction, and would not have thereby done so if he had been a party in the cause; if he has been mistaken, he has been innocently so; and declares that he did mean, and does still mean, to obey, and not to violate any order of this honorable court, or any other lawful tribunal.

He states that in operating this instrument he was not the agent of Henry O'Rielly, or in his employ, nor had he been in his employ for months before that time. He operated solely for the purpose of evincing the capacity of the instrument of which he was an inventor, to show his skill in reading communications from that instrument without any marks, and without any variation of the tones of the small sounds given, and to gratify the great public expectation of a good line south, and to meet the necessity of a line toward New Orleans. It was an important matter for the public to have the benefit of this new instrument, if it could be had without a violation of Morse's patent; it was and now is his opinion, without doubt, that it is not a violation of that patent, as he has worked it since the injunction. As to the manner of the instrument theretofore, it does not become him to speak here, as your honor has given an opinion on that subject in granting the injunction. What he did he did openly, as his publication, or rather the publication of his letter, read by the complainant's counsel, shows. He is sorry the parties did not move to injoin him, and let him be heard, instead of waiting till this time and taking out a peremptory attachment against him, and seizing his person, without an opportunity to be heard before your honor.

It may readily occur to this court that there are many modes of telegraphing which would not be a violation of the injunction herein, or of the patent of Professor Morse. There might be difference of opin-

ion among intelligent men as to what would be a violation, and what would not be so; and surely it seems to the party answering, that if a man is using the ingenuity which God has given him, in a manner which he thinks is not even intended or wished to be restrained, he should not be deemed a wilful violator of the rights of others, or of the authority of his country's courts.

The magnetic telegraph is new to America; it is comparatively new to the world; it has surprised the age; it has awakened genius. New and great questions of difficulty do arise, and must arise, on this subject, as well in the minds of private men as in the minds of those who fill the seats of authority; and to differ in honesty, he humbly suggests, is not a contempt of the authority of law.

He will not protest; this is not the place where he can utter such a word, or claim his judgment against the order of this court; but he does, as a citizen of New York, casually in Kentucky, respectfully suggest to this honorable court, that the proceeding by instant attachment against him is in violation of the rights of an American citizen, who should be a party to a suit, or in some manner be heard, before his person is seized on alleged contempt, on the authority of the courts of his common country.

Mr. Church was in his employ, not in that of Mr. O'Rielly, in operating with said telegraph.

He again declares, that in all he has done he did not mean to violate the rights of others or the injunction issued in this cause; and he now submits himself to the judgment of this honorable court.

EDMUND F. BARNES.

Sworn to in open court, October 21st, 1848.

Att., JOHN H. HANNA,
C. C. C., K. D.

MORSE and others
vs.
O'RIELLY and others

Edmund F. Barnes further states on oath, that he has not and never had any stock or interest in any telegraph line in America. That he is not and never was the associate of said O'Rielly, in carrying or conducting any line of telegraph, except so far as his operating on a telegraphic instrument might be so considered. When the injunction herein was granted, it was confidently believed by him, before he saw the writ, that it must be confined to the State of Kentucky, and also to the operating by a register; and when he saw it he so understood it. Mr. O'Rielly is, as he understands, but the agent of others, and not the owner of the line in contest; he, perhaps, has some interest of some kind, but he acts barely as an agent; and when the injunction was granted, he, for the reasons which he has already stated, and sincerely believing he was not about to violate the injunction, asked to have the liberty of using the wires, &c., and operate with his instrument, changed as referred to, principally, indeed, to show that he

had an instrument which did not violate the patent of Professor Morse or the injunction obtained, and to answer the public expectation created partly by himself, by what he had allowed to [be] mentioned of his instrument in the newspapers. Mr. O'Rielly, as agent of the trustees of the line, executed the contract with him, a copy whereof is herewith exhibited, and the said O'Rielly distinctly declared to him that, whatever telegraph he worked there, must not be in violation of the injunction or the patent of Prof. Morse, as interpreted by the order of the judge, and he soon thereafter left Kentucky. He looked upon himself as acting, by the permission of the trustees, for the purposes stated, which, if not in violation of the injunction, he thinks should be deemed laudable. He again says, he thought he was acting innocently, and he prays this honorable court not to compel him to enter into a bond to be responsible for the acts of persons with whom he has no interest or association whatever, and almost all of whom are persons, as he believes, whom he never has seen, and with whom he has no sort of acquaintance.

Sworn to, in open court, by Edmund F. Barnes, this 23d October, 1848.

Att: JNO. H. HANNA, *C. C. C., K. D.*

Contract—Barnes & O'Rielly.

(Contract between Barnes & O'Rielly, to wit:)

(Copy.)

"Agreement. I, Edmund F. Barnes, agree to hire the use of the posts, wires, and other telegraphic apparatus on "The People's Line" between Louisville and Nashville, (being part of the route to New Orleans,) the said line to be worked by means which will not infringe the just claims of any other inventor; and I agree to pay all expenses connected with the working and keeping the said line in good repair, till the completion and delivery of the whole Louisville and New Orleans line into the hands of the trustees, for the subscribers or stockholders for whom it is constructed, or until any other time, when this agreement may be rescinded, after ten days' notice, by Joshua Hanna, Sandford J. Smith, and John J. Roggen, (who are now trustees.) The keeping of this part of the line in good order for the above purposes, and until this agreement ends, being the consideration for the use of the posts, wires, &c., and for any profit that may be derived therefrom.

In witness whereof I have hereto subscribed my name, this fifteenth day of September, A. D. 1848.

EDMUND F. BARNES.

Witness—EUGENE L. WITMAN.

E. F. Barnes' bond.

(The bond executed by E. F. Barnes, to wit:)

Know all men by these presents that we, Edmund F. Barnes and

Theodore S. Bell, W. N. Haldeman and Richard H. Woolfolk, his security, are held and firmly bound unto Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, in the sum of five thousand dollars, to be paid to the said Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, their certain attorney, their heirs, executors, administrators, or assigns; to which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, firmly by these presents. Sealed with our seals, and dated this 24th day of October, 1848.

The condition of this obligation is such, that whereas, in the circuit court of the United States for the Kentucky district, at the present October term, in the case of Samuel F. B. Morse and others vs. Henry O'Rielly and others, on the return of an attachment issued on behalf of the complainants against Henry O'Rielly, E. L. Whitman, E. F. Barnes, and William R. Church, on the hearing thereof:

It seemed to the court that the operations of the telegraph of the defendants, O'Rielly, &c., in the writ of injunction mentioned by the said Barnes, in the transmission of intelligence from the city of Louisville, within the district of Kentucky, to Nashville, without the district, by making at that place the record thereof in the telegraphic characters indented upon the paper, off which it was put into the manuscript for the correspondent, was a palpable violation of the injunction; and that his operations of the same telegraph, in receiving intelligence from Nashville at Louisville, in and by sounds made by the same action of the telegraph, which in its regular operation would have made the record in the telegraphic characters indented upon the paper, and therefrom putting the same into manuscript for the correspondents, was a mere evasion of the injunction, and substantially a violation thereof, and of the rights of the complainants. And

Thereupon, it was ordered by the court, that the said Edmund F. Barnes might execute bond to the complainants, in the penalty of five thousand dollars, with one or more sufficient securities; conditioned to be void if the said Barnes shall not, by himself or another, in anywise violate the injunction in said writ, according to the sense above recited. And the said Barnes having elected to give such bond, and tendered the said Theodore S. Bell, W. N. Haldeman, and Richard H. Woolfolk as his securities:

Now, if the said Edmund F. Barnes shall not hereafter, by himself or another, violate the said injunction contained in the said writ of injunction, in the said case of Saml. F. B. Morse and others vs. Henry O'Rielly and others, according to the true sense thereof, as by the above order declared, then this obligation to be void; otherwise to remain in full force and virtue.

EDMUND F. BARNES, [SEAL.]
THEODORE S. BELL, [SEAL.]
By R. H. WOOLFOLK, *Att. in fact.*
W. N. HALDEMAN, [SEAL.]
By R. H. WOOLFOLK, *Att. in fact.*
R. H. WOOLFOLK. [SEAL.]

The following is the power of attorney to R. H. Woolfolk, to wit:

Power of attorney.

Know all men by these presents, that we, Theodore S. Bell and W. N. Haldeman, of the city of Louisville, and State of Kentucky, do hereby make, nominate, constitute, and appoint Richard H. Woolfolk, of the same place, our true and lawful agent and attorney in fact, for us and in our names, or in the name of either of us, jointly or severally, to execute, sign, seal, acknowledge, and deliver, any and all bond or bonds, recognisance or recognisances, that the circuit or district court of the United States, sitting at Frankfort, Kentucky, in the case of Morse and others against O'Rielly and others, or the suit in which the right of Morse and others to the exclusive use of the telegraph is called in question and decided, or to be decided, may direct Edward F. Barnes to enter into. Our said attorney is hereby clothed and vested with full right and power to enter our names, or the names of either of us, alone, or with any one or more persons, as the surety or sureties for said Barnes in any bond or bonds, recognisance or recognisances, that the said court may require the said Barnes to enter into, and which our said attorney may deem it right and proper that we, or either of us, should make or enter into. We do not know what form may be required by the court, but we hereby waive all form, and give to our said attorney full power to bind us as the sureties of said Barnes, or either of us, in any way the said court may require.

Witness our hands and seals this 21st October, 1848.

THEODORE S. BELL, [SEAL.]
W. N. HALDEMAN. [SEAL.]

Witness—

JAMES SPEED as to B.
W. G. PROCTOR as to H.

The following proceedings were had in the case of the attachment against Richard H. Woolfolk, Albert Jones, and S. K. Zook, to wit:

Order of attachment.

At the October term of the court aforesaid, to wit, on the 6th day of November, 1848, came the complainants, by their counsel, and on their motion it is ordered, that an attachment be issued against Richard H. Woolfolk, Albert Jones, Henry S. Johnson, and S. K. Zook, servants and agents of defendants, returnable here on Thursday next, to answer the charge, by the complainants, of a contempt committed by them in disobeying and violating the injunction awarded herein by the district judge at his chambers, and contained in the writ, which issued accordingly, and was executed, as it appears by its return.

Whereupon the following attachment was issued, to wit:

[L. S.] The United States of America, to the marshal of the Kentucky district, greeting:

You are hereby commanded to attach Richard H. Woolfolk, Albert

786.

Jones, Henry S. Johnson, and S. K. Zook, if they be found within your bailiwick, and them safely keep, so that you have their bodies before the judges of our eighth circuit court of the United States of America, in and for the Kentucky district, at the Capitol in Frankfort, on Thursday next, to answer us, as well of a certain contempt by them to us offered, as upon those things which shall then and there be objected against them; and have then there this writ.

In testimony whereof Roger B. Taney, esq., chief justice of the Supreme Court of the United States, hath caused the seal of our said court to be hereunto affixed, this 5th day of November, 1848, in the 73d year of our independence.

Attest: JNO. H. HANNA, *C. C. C., K. D.*

(Endorsement.) This attachment is issued for a contempt in violating the injunction awarded by the district judge of the United States, Kentucky district, at his chamber, in the case of Samuel F. B. Morse, &c., vs. H. O'Rielly, &c.

Attest: JNO. H. HANNA, *C. C. C., K. D.*

(Marshal's return, to wit:)

Executed on Richard H. Woolfolk, Albert Jones, and S. K. Zook, by bringing their bodies into court this 9th November, 1848. Henry S. Johnson not found.

C. G. MORRIS,
Deputy Marshal.

Order—Johnson discharged from attachment, and Zook and Woolfolk heard.

And at a subsequent day of said October term, to wit, on the 9th day of November, 1848, came the complainants, by their counsel, and the marshal having returned the writ of attachment, awarded herein, at the present term, against Richard H. Woolfolk, Albert Jones, Henry S. Johnson, and S. K. Zook, executed upon the said Woolfolk, Jones, and Zook, and as to Henry S. Johnson, not found; he accordingly produced the bodies of the said Woolfolk, Jones, and Zook in court. Whereupon,

The said Jones was heard in answer to the alleged contempt by him committed, and the proofs having been heard, and the court sufficiently advised:

It is ordered that the said Albert Jones be, and he is hereby, discharged; and that the complainants pay to him his costs in his defence expended.

And the said Zook and Woolfolk were heard in their defence, and proofs of the parties were heard; whereupon the matter was argued by counsel; but the court, not being sufficiently advised, took time.

And at a subsequent day of said October term, to wit, on the 10th day of November, 1848, the court being now sufficiently advised, and having considered the case:

It is found on the proofs, that S. K. Zook was the superintendent of the line of telegraph of the defendants from Louisville to Nashville, and as such had, under them, the power over it and their agents employed in its operations; and that, after the proceedings had herein against Barnes, and the defendants had absented themselves from the district, caused the line of wires to be extended from Louisville to Jeffersonville, Indiana, without the district of Kentucky, and caused the instruments of the telegraph office in Louisville, the use whereof the defendants, O'Rielly and others, had been prohibited by this injunction, to be removed across the Ohio to that place; and thereupon, as such superintendent, caused the telegraph of the defendants, with the position of a portion of its instruments so changed, to be put in operation and conducted in a mode within the prohibitions of the writ of injunction against his principals.

It appears that the same office of the defendants in Louisville was still occupied, and that all communications to be transmitted thence were received thereat, and thence transferred by the carriers and servants of the defendants to Jeffersonville, whence they were accordingly dispatched on this telegraph so situated in part within this district, and it seems to the court that such change of the position of a portion of the instruments was but an attempt to evade the injunction; and that such operation of the telegraph, with the instruments partly within the district, the use whereof within it had been prohibited by the injunction, was a violation thereof; and that this party, S. K. Zook, is guilty of the contempt wherewith he is charged. And

It is ordered, that the said S. K. Zook, for his offence aforesaid, make his fine to the United States by the payment of the sum of two hundred and fifty dollars, and also the costs in this proceeding expended; and that he stand committed and be confined in the jail of the county of Franklin, State of Kentucky, until the same shall have been paid, or he shall be discharged by due course of law.

And for the security of the complainants against the further violation of the injunction by him, the said S. K. Zook,

It is ordered, that he, the said S. K. Zook, be, and he is hereby, required to execute bond to the complainants in the same penalty in which the bond was required of them on obtaining the injunction, with one or more sufficient securities, with condition that if the said S. K. Zook do not in any wise, as the servant or agent of the defendants, directly or indirectly, violate the said injunction in said writ contained, according to its true meaning as declared by the above and preceding orders in this cause, then this obligation to be void, otherwise to remain in force; and that on his failing to execute such bond he stand committed and be imprisoned in said jail of the county of Franklin until such bond shall be executed, or until the next term of this court, or its further order. And

It is found that Richmond H. Woolfolk was, before the writ of injunction was issued, and has been ever since, in the employment of the defendants in their office in Louisville, as their receiving clerk,

wherein he did after the writ had been executed, receive communications to be transmitted by their telegraph, and which were so transmitted in violation of the injunction, and that after the removal of a portion of the instruments to Jeffersonville, he continued in this office, and received communications which were transferred by the carriers of the defendants to Jeffersonville, and thence transmitted on the telegraph so partly situated within the district; and that such communications having been so transmitted by the telegraph of the defendants, the use whereof within the district of Kentucky had been prohibited by the writ of injunction:

It seems to the court that his acts, both before and after such removal of a portion of the instruments, was a violation of the injunction, and that the said Richard H. Woolfolk also is guilty of the contempt wherewith he is charged.

And it is ordered, that the said Richard H. Woolfolk, for his offence aforesaid, make his fine to the United States by the payment of the sum of two hundred and fifty dollars, and also the costs in this proceeding expended, and that he stand committed and be confined in the jail of the county of Franklin, State of Kentucky, until the same shall have been paid, or he shall be discharged by due course of law.

And for the security of the complainants against the further violation of the injunction by him, the said Richard H. Woolfolk,

It is ordered, that he, the said Richard H. Woolfolk, be, and he is hereby, required to execute bond to the complainants in the same penalty in which the bond was required of them on obtaining the injunction, with one or more sufficient securities, with condition that if the said R. H. Woolfolk do not, in any wise, as the servant or agent of the defendants, directly or indirectly violate the said injunction in said writ contained, according to its true meaning as declared by the above and preceding orders in this cause, then this obligation to be void, otherwise to remain in force; and that on his failing to execute such bond he stand committed and be imprisoned in said jail of the county of Franklin until such bond shall be executed, or until the next term of this court, or its further order.

Whereupon the said Richard H. Woolfolk and S. K. Zooks, with Theodore S. Bell and W. N. Haldeman, their securities, respectively executed their bonds to the complainants in the penal sum of five thousand dollars, with the condition above prescribed. And thereupon

The said S. K. Zook and R. H. Woolfolk presented their petition, averring their inability to pay the amount of the fines above in this matter adjudged, and praying the court a remission thereof:

On consideration whereof, and of the representations of the counsel of the complainants, the said fines are remitted.

And it is therefore ordered that the said orders—one, that the said Zook, and the other that the said Woolfolk make their fine to the United States by the payment of the sum of two hundred and fifty dollars—be, and the same are, discharged; and that on the payment of the costs

of the proceedings in this matter the parties may be respectively discharged. And

The costs aforesaid having been paid, the said S. K. Zook and R. H. Woolfolk are discharged of custody.

Affidavit. R. Isaacs.

8TH CIRCUIT, KENTUCKY DISTRICT, *Louisville, ss.*

This day Richard Isaacs, a citizen of Louisville, and well known to me, came personally before me in said city, a commissioner of affidavits, &c., in and for said circuit and district, and being duly cautioned and sworn, and of lawful age, doth depose and say, that he is engaged in the dry goods business in the city of Louisville for Robertson and Brothers. That on the 26th of October, 1848, or on the 25th of that month, on one or the other of which days he is certain that he took to the office of O'Rielly's line at Louisville a message in writing, to be transmitted by that line to Nashville, addressed to G. P. Smith, care of Smith and Johnson, at that city, and paid at the said office twenty-five cents therefor to one Eugene Lattipie, clerk in O'Rielly's office. Said Lattipie informed affiant that the wires were crossed, and that a message, in consequence, could not be sent until that evening, or the next morning. Henry Johnson, one of O'Rielly's operators, was present at the time of said conversation with said Lattipie in said office, in the second story of the telegraph building, at the corner of 3d and Market streets, in Louisville.

Affiant further states, that, on the 27th October, he received by the said O'Rielly's line from Nashville an answer to the said message from Smith, for which he paid thirty-five cents, the charge for same being 33 cents. Affiant annexes hereto the note in answer to his said message from said Smith which he received as aforesaid, and makes the same part of this affidavit. Affiant, to identify the same, has written his name, and this date, the 31st October, 1848, across the face of said answer addressed to him from G. P. Smith.

And further saith not

RICHARD ISAACS.

Subscribed and sworn to by said affiant, and reduced to writing by me in affiant's presence.

W. S. PILCHER, *Com'r.*

October 31*st*, 1848.

O'Rielly's Line.

Louisville, Nashville, and New Orleans People's Telegraph; Louisville office, Telegraph building, 2d story, 3d street.

The following communication was received at this office at 10 o'clock 15 minutes, a. m., dated

NASHVILLE, *Oct.* 27, 1848.

MR. RICHARD ISAACS, *Louisville.*

DEAR SIR: Your despatch just to hand. Freight to Paducah, 50 cents. River falling.

G. P. SMITH.

Affidavit. Tho. C. McAfee.

8th CIRCUIT, KENTUCKY DISTRICT,
Louisville, Jefferson county, ss.

This day Thomas C. McAfee, a citizen of Louisville, of lawful age, and duly cautioned and sworn to tell the truth, &c., being personally known to me, came before me, commissioner of the United States in and for said circuit and district, and made oath as follows:

That he is an operator in the Telegraph building, corner 3d and Market streets, Louisville, in the office of Morse and Co. That after E. F. Barnes was taken to Frankfort upon the attachment issued by the federal court in the case [of] Morse, &c., against O'Rielly, &c., and about eight or ten days ago, the instrument and apparatus which had been used in O'Rielly's office in said building, for operating upon O'Rielly's line from Louisville to Nashville, was removed across the Ohio river to the town of Jeffersonville, in Indiana, for the purpose, as affiant was informed and believed, of operating from that place to Nashville. Affiant further states that, prior to the removal of said instrument and apparatus to Jeffersonville, there were two lines of wire across the river at Louisville, one to Cincinnati, and the other to St. Louis, upon posts erected by Henry O'Rielly; that after said removal a third wire has been stretched across the river on posts, extending the O'Rielly line from Nashville to Louisville to the said instrument in Jeffersonville. Affiant further states that Albert Jones, engaged in O'Rielly's office as book-keeper, came in Morse's office with a number of communications, to be sent, some of them to Nashville, on Morse's line, stating that O'Rielly's line was not working: this was about the time of the aforesaid removal of the instruments, &c., to Jeffersonville, Indiana. Affiant verily believes that the said instrument at Jeffersonville began to operate to Nashville on Thursday, the 26th instant. He further states that on Saturday, the 28th instant, he had a telegraphic message from H. M. Waterson at Nashville, by Morse's line, stating that the Europa's news had been received there on Thursday, the 26th, by O'Reilly's line, and published in a Nashville paper on Friday morning, the 27th instant. Affiant states that he is acquainted with S. K. Zook, one of the firm of Zook and Barnes, inventors of the Columbian Telegraph. That on Saturday evening, the 28th instant, said Zook told affiant that they removed over to Jeffersonville, Indiana. That they had put up one fine wire from Jeffersonville to Louisville; that being left too slack in the night, a steamboat had come down and broke it, and it had to be replaced by another wire. That on Monday, yesterday morning, the 30th instant,

he being in Jeffersonville, visited the office established there for working the line to Nashville; that he saw then the said line in operation. Henry S. Johnson, an operator of O'Rielly, and before the removal aforesaid was employed in O'Rielly's office in Memphis, having learned the business of operating in O'Rielly's office in Louisville, was engaged in said office in Jeffersonville, whilst affiant was present, in sending and receiving messages to and from Nashville. The instrument by which the same was done was the same Columbian Telegraph exhibited on the hearing of the motion for an injunction against O'Rielly last August before the district judge at Frankfort, Ky., and was operated by means of the same local or resident circuits, connected with the main line by the same mutator then exhibited. Affiant stayed about half an hour in said office. The instrument recorded the messages from Nashville upon a ribbon of paper by dots and lines representing letters. Affiant further says that the course in which the business of said line was done at that time, and he believes so continues to be done, is that messages from Louisville to Nashville are received in O'Rielly's office at Louisville as before the removal, and sent across by the ferry boat to Jeffersonville for transmission to Nashville, and the answers from Nashville sent back across the river in notes issued at said office, such as the one filed as part of the affidavit of Richard Isaacs. Affiant states that he saw several messages from Nashville written down in said office in Jeffersonville, and sent by a boy on the ferry boat to Louisville; when at the ferry landing, the regular carrier of O'Rielly's office was waiting to receive them. He further states that he is informed and verily believes that said S. K. Zook, as well as E. F. Barns, is now and has been for some time past in the employment of H. O'Rielly. He also states that the operations between Jeffersonville and Nashville are upon the same line of wire from Louisville to Nashville heretofore operated upon by H. O'Rielly's people, and built by him, and he believes that the said operations are continued from Jeffersonville, via Louisville, to Nashville. He further states that during the time of the aforesaid removal of the instrument to Jeffersonville, and before operations began thence, the business of Morse's line from Louisville to Nashville was more than doubled; and since said operations from Jeffersonville began the business of Morse's line has fallen back to about what it was before. Since said line has been working from Jeffersonville, to wit, on Saturday the 28th instant, in the O'Rielly's office in Louisville, affiant held a conversation with E. F. Barns, in presence of S. K. Zook and others in said office, in which said Barns said that the said instrument had been removed to Jeffersonville; and they had got out of the way of Judge Monroe, and that he did not think that Judge Monroe could reach him there. Affiant does not give the precise words used by said Barns, but gives the substance of what he said. And further saith not

THOS. C. McAFEE.

Reduced to writing by me, and subscribed and sworn to before me, this 31st October, 1848. W. S. PILCHER, *Com'r.*

I, William S. Pilcher, commissioner of affidavits, &c., in and for the 8th circuit, Kentucky district, certify, that the foregoing affidavits were taken down in writing by me, in presence of the affiants, Richard Isaacs and Thomas C. McAfee, and that they swore to and subscribed the same in my presence, in the city of Louisville; and that I am of kin to neither of the parties, and have no interest in the event of this suit. Given under my hand, this 31st October, 1848.

W. S. PILCHER,
Com'r U. S., &c.

Affidavit of Charles Carvill.

8TH CIRCUIT, KENTUCKY DISTRICT,
Jefferson county, ss.

This day, Charles Carvill came before me, at my office in the city of Louisville, in said county, and being of lawful age, and first duly cautioned and sworn, made the following affidavit, to be read on behalf of complainants in the matter of Morse, &c., vs. O'Rielly, &c., pending in the court of the United States, in and for the said circuit and district.

Affiant states that he is the receiving clerk in Morse's telegraph office at Louisville, Ky.; that on the 1st instant he received from R. H. Woolfolk, clerk in the office of the O'Rielly telegraph line at Louisville, a despatch to be forwarded to Frankfort, dated Memphis, October 31st, 1848, from W. H. Keene, of Memphis, to Thos. N. Lindsey at Frankfort, and which he fully believed was transmitted by means of the O'Rielly line of telegraph from Memphis, by way of Nashville, to Louisville, it being dated (Memphis, October, 31st,) and handed to affiant as aforesaid by 9 o'clock in the morning of the 1st of November at Louisville. At the time said Woolfolk handed said message to affiant he paid to affiant the sum of twenty cents, for the transmission of the same from Louisville to Frankfort by Morse's line, and the same was so transmitted.

Affiant further states, that he is personally acquainted with said Woolfolk; that he has been for a considerable time, both before and since the injunction was granted against O'Rielly in September last, in the employment of said O'Rielly, and been engaged as his chief financial and business clerk in said office. One part of the business of the said Woolfolk in said office of O'Rielly has been receiving and forwarding messages in and from said office, and receiving and paying the money therefor; said Woolfolk is styled O'Rielly's agent. Affiant further states that he is acquainted with Albert Jones; he has been the book-keeper in O'Rielly's office until lately, and I can say that he now holds a similar situation to that of Woolfolk, they having divided that business between them. Affiant knows that each of them has performed the duties before stated; Jones was in O'Rielly's office before the injunction aforesaid. Affiant verily believes that said Woolfolk and

said Jones are still employed by and in the office and service of said O'Rielly; and further saith not

CHAS. CARVILLE.

Subscribed and sworn to before me, November 3d, 1848.
W. S. PILCHER, *Commissioner.*

Affidavit of T. P. Shaffner.

Also, the affidavit of T. P. Shaffner, taken by and before me at the same time and place, to be read in the same behalf.

Affiant being of lawful age, and first duly cautioned and sworn, doth depose and say:

That his office is in the Telegraph building corner Third and Market streets, Louisville; in said building is the office of H. O'Rielly's or Peoples' line from Louisville to Nashville; that he is acquainted with Richard H. Woolfolk and Albert Jones, who are and have been for some time past in the employment of said O'Rielly; that said Woolfolk is the receiving clerk in said O'Rielly's office, and has acted as his agent for the said People's line, his business amongst other things being to receive the money paid for despatches to be sent over the lines diverging from the said O'Rielly's office at Louisville aforesaid, and said Albert Jones has acted as book-keeper in said office. These persons have been employed as above stated for a considerable time, extending back several months prior to the injunction granted in September, 1848, against said O'Rielly and his agents, in the court of the United States at Frankfort. Affiant further states that he has read the affidavit of Thos. C. McAfee, made before W. S. Pilcher, commissioner of the United States for the Kentucky district, residing in the city of Louisville, in Jefferson county, in said district and State, on the 31st October last past, in reference to the removal of the Columbian instrument and apparatus from the said office of O'Rielly in Louisville to the town of Jeffersonville, Indiana; that affiant is personally acquainted with many of the facts stated in said affidavit, and says that they are true, so far as he knows them of his own knowledge; and from his knowledge of the character of said McAfee for truth, he believes all the facts stated therein on the knowledge of said McAfee to be true; that he knows that said instrument and apparatus are removed from Louisville to said Jeffersonville, as stated by McAfee, and that this affiant was present with said McAfee in the said office in Jeffersonville on the occasion stated in McAfee's affidavit, after the removal, and with him saw the operations upon the said instrument there, by Henry S. Johnson, in sending and receiving messages to and from Nashville by the said O'Rielly's or People's line, which had been extended as he understands and believes for that purpose across the river from Louisville to Jeffersonville. Affiant states that he observed upon that occasion the facts stated by McAfee.

Affiant further states that prior to the said removal there were two

wires across the Ohio river between Louisville and Jeffersonville, one extending eastward and the other westward, and beyond the latter place. About the time the said instrument was being removed as aforesaid, a third wire was put up, which extended the line to Jeffersonville to the said instrument.

Affiant has known Henry S. Johnson for some years or more; he learned to operate in the O'Rielly office in Louisville, on the Columbian instrument on said People's line, and then left for the O'Rielly office in Memphis, Tennessee, as affiant was informed by said Johnson and others about the time the attachment issued against Barnes; affiant observed the said Johnson again in O'Rielly's office at Louisville, and when the removal was made to Jeffersonville, Mr. Johnson went over to operate, and has continued there since, and affiant verily believes as the agent and operator for O'Rielly. Affiant is also acquainted with S. K. Zook, of the firm of Zook and Barnes, alleged inventors of the Columbian telegraph. He has known said Zook for more than a year. When first acquainted with him he was in the employment of O'Rielly as an operator in the Cincinnati telegraph office. When the line was built by O'Rielly from Louisville to Nashville, said Zook put up the Columbian instrument at Louisville to work on said line. He afterwards went to Nashville, and there put up on Rielly's line the Columbian instrument, as affiant was informed by said Zook. Affiant saw said Zook in Nashville in April last in said O'Rielly's office there, in charge thereof.

Affiant held several conversations with him there, in the course of which he was informed by said Zook that he was then and there doing business for said O'Rielly, and when said instrument was up was operating upon it in the service of said O'Rielly. Affiant saw Zook at the time of the removal of the instrument (a) and furniture to Jeffersonville aforesaid, and he was assisting and superintending the said removal. In a conversation with said Johnson he, the said Johnson, stated that he expected shortly to return to the O'Rielly office at Memphis to operate there, and he said in substance that he could not go immediately, as Mr. Zook was very busily engaged in making out his report. And affiant states that the said Zook was then and yet is apparently engaged in the office of said O'Rielly in Louisville aforesaid. Affiant has frequently seen said Zook writing in said office. The conversation above stated with Johnson took place at the time of the visit made as aforesaid to the office at Jeffersonville in company with said McAfee, and at the time mentioned in his said affidavit.

Affiant further states, that after the removal aforesaid to Jeffersonville, and of operations begun there, he witnessed the delivery of two or more messages in the O'Rielly office at Louisville, to be sent on the line to Nashville by telegraph, one to said Woolfolk, the others to said Jones, and on each occasion saw the money paid to them respectively for the transmission of said messages. This business was transacted as such business was usually done prior to the removal, so far as affiant

knows and believes. And affiant has since frequently seen persons going into the office aforesaid with messages to be transmitted over said O'Rielly's People's line; that on several occasions he has met persons on the stair-way, and at the entrance of the building, inquiring for the office in which messages could be sent to Tuscumbia, Alabama, and he has shown them O'Rielly's office, (Morse's line not being extended to Tuscumbia,) and affiant has seen some of the messages delivered and paid for at said O'Rielly's office at Louisville. Affiant states that the operating office at Louisville is adjoining the receiving office; that Mr. Jones has heretofore kept his books in the receiving office; that Mr. Woolfolk has been recognised as a receiving clerk for all the lines, and in his absence affiant has frequently seen Mr. Jones receive the despatches and money; that when the "People's line" was working from Louisville the office was over and up-stairs, above the receiving office, and messages destined for points south were conveyed from said receiving to said operating office by a lifting slide weight; that since said removal to Jeffersonville affiant states, from his own observation, that the messenger for Louisville city carried those messages to be transmitted to Nashville and points south to the ferry-boat, and they are thence carried to Jeffersonville by some one on said ferry-boat, and delivered to another messenger on the Indiana shore, and then by him carried to the office in Jeffersonville; and messages for Louisville, from Nashville, and points south, are brought to Louisville in like manner. Affiant further states, that he clipped from the "Louisville Daily Journal" of this morning the following public notice, which he exhibits as part of this deposition.

Affiant further states, that the particulars in regard to the putting up the third wire across the Ohio river, from Louisville to Jeffersonville, he obtained from observation and conversation with Richard Smith, pump-maker, &c., who put up the said wire. * That said Smith is now constructing a line across the Ohio river, which led to the examination of the posts or masts and wires now used to cross the Ohio river by telegraph, and led also to affiant's conversation with said Smith, and also to affiant's visit aforesaid to Jeffersonville. And further saith not

TAL. P. SHAFFNER.

Subscribed and sworn to before me, Nov. 3d, 1848.

W. S. PILCHER, *Com.*

I, William S. Pilcher, commissioner of affidavits, &c., of the United States, in and for the 8th circuit, Kentucky district, residing in the city of Louisville, therein certify, that the foregoing affidavits of Charles Carville and T. P. Shaffner were written down by me in the presence of said affiants respectively; that each of them was duly cautioned and sworn to tell the truth, the whole truth, and nothing but the truth, by me; and that the said affidavits, so written down by me, each of them did sign in my presence; that each of said affiants is known to me; that they are more than twenty-one years of age; that I believe them

to be persons entitled to credit; that I am not of kin to either or any of the parties to this suit; that I am not of counsel for any party therein; that I have no interest in the event thereof; and that I took said affidavits at my office in said city on this 3d day of November, 1848. Given under my hand the day and year aforesaid.

W. S. PILCHER,
Commissioner, &c.

Tal. P. Shaffner makes the following correction in this affidavit, upon this paper written down by W. S. Pilcher incorrectly, to wit, at the * he is made to say "that said Smith is now constructing a line across the Ohio river," when it should read, "said affiant is now constructing," &c., also at the letter (a) at the third page of the affidavit the word instrument should be left out.

Sworn to this 10th November, 1848.

Att: JNO. H. HANNA, *C. C. C., K. D.*

The following is the notice referred to in the affidavit of T. P. Shaffner, to wit:

"PEOPLE'S TELEGRAPH LINE"

To New Orleans, chartered by the Kentucky legislature to repress monopoly and encourage salutary competition in telegraphing.

This line, constructed by Henry O'Rielly and his associates, is now working regularly between Louisville, Nashville, Tuscumbia, Memphis, Holly Springs, &c., &c.

It is also working between Baton Rouge and New Orleans, making a total of about seven hundred miles now in working order. The wiring of the intermediate section is nearly finished, and the whole line of a thousand miles will be completely in operation in a few weeks.

Mean time despatches to and from New Orleans may be sent on this route by telegraph as far as completed, and transmitted by steamboat between Memphis and Baton Rouge, thus gaining considerably on the mail.

As there are several telegraph systems within reach of Henry O'Rielly, these lines are not stopped by any injunctions against any one plan of telegraphing.

Captains and passengers in steamboats along the Ohio and Mississippi, and other rivers, as well as along the great lakes, can send and receive despatches as they touch at different points connected by the vast lines of the "Atlantic, Lake, and Mississippi Telegraph," constructed by Henry Rielly and his associates.

CHARLES DOANE, New Orleans,
J. H. BOURNE, Memphis,
JOHN J. RIELLY, Louisville.

Affidavit of R. H. Woolfolk.

Affidavit of Richard H. Woolfolk, to wit:

UNITED STATES
vs.
RICHARD H. WOOLFOLK.

Attachment.

Richard H. Woolfolk states, in answer to the attachment, that he is not now, nor has he been since the granting of the injunction in the case of Morse & Co. vs. ———, employed in any way in the working of the telegraph line from Louisville to Nashville, Memphis, &c., known as the People's, nor has he in any way been employed in any way in the working of any instrument on any telegraph line. But that he was employed by said O'Rielly in a financial capacity to disburse the funds for the construction of said line. And that since the assignment of said O'Rielly, which was made on the 8th July, 1848, he has been employed by his trustees, Joshua Hanna and S. L. Roggen, of Pittsburg, Pennsylvania, and Sanford J. Smith, of St. Louis, Missouri, as their agent in settling up of claims for and against said O'Rielly; that is to say, the outstanding debts and liabilities of said O'Rielly, which were incurred previous to that time. He has also been employed by them in the disposal of stock in the Louisville, Cincinnati and Pittsburg, and Ohio and Mississippi lines. And that he is now employed by the Ohio and Mississippi Telegraph Company, said company being chartered by Indiana, extending from Louisville to St. Louis, as their book-keeper and receiver, and has in conjunction with that office received some despatches for the People's line, but in doing so he assumed no responsibility in sending them. The affiant must be permitted to state, that in receiving despatches he was not aware he was disobeying the honorable court's injunction, otherwise he would not have done so.

He has only to say, that he has no desire now, nor has he ever had, to disobey the order of injunction of your honorable court. And as he has had no control or interest over the working of the People's line, he cannot conceive, therefore, that your honor will consider him guilty of disobeying the injunction, and prays to be discharged.

October term, 1848.

Sworn to in open court by Richard H. Woolfolk, 9th Nov., 1848.

Attest: JOHN H. HANNA, *C. C. C., K. D.*
By D. MURPHEY, *Dep. Clerk.*

Affidavit—A. E. Jones.

(Affidavit of Albert E. Jones, to wit:)

UNITED STATES
vs.
ALBERT E. JONES.

On attachment.

Albert E. Jones states, in answer to the attachment, that he is not

now, nor has he been since the granting of the injunction in the case of Morse, &c ., vs. O'Rielly, in the employment of O'Rielly, nor in any wise doing business for said O'Rielly, or for any one else on the telegraphic line from Louisville to Nashville, or upon any other telegraphic line in the United States, upon which any other instrument was worked or used save that of Morse. That he is now in the employment of the Ohio Telegraph Company, chartered by the Ohio legislature, extending from Pittsburg to Louisville. That he was up to the first of the present month in the employment of the Ohio and Mississippi Company, chartered by the Indiana legislature, on the line from Louisville to St. Louis, in conjunction with the aforesaid Ohio Telegraph Company. He states the office of the companies above mentioned, and in whose employment he was and is, is kept in the same room and building with the O'Rielly office, and that in the absence of the receiver or clerk of the O'Rielly office, he may have, as a matter of personal accommodation, received and handed over to the operator of the O'Rielly line a despatch and money, not being however in any way responsible for said acts, receiving no compensation for so doing. He further states, he did not suppose what he did merely for the accommodation of a friend any violation of the order of injunction granted by this honorable court, or he would not have even done that. He states, that he did know an injunction had been granted in favor of Morse, &c., vs. O'Rielly, but that not being in any manner connected with O'Rielly, or any of his agents, he had never read said order of injunction, and therefore did not know that the receiver of said line was violating the same, and still less did he suppose that he was violating it in doing what he did. He now having answered, prays to be dismissed.

October term, 1848.

Sworn to in open court, by Albert E. Jones, this 9th November, 1848.

Att: JNO. H. HANNA, *C. C. C., K. D.*
By D. MURPHEY, *Dep. Cl'k.*

Affidavit of S. K. Zook.

(Affidavit of S. K. Zook, to wit:)

UNITED STATES vs. S. K. ZOOK. } On attachment.

S. K. Zook states, in answer to the attachment, that he is now, and was before the granting of the order of injunction in the case of Morse, &c., vs. O'Rielly, in the employment of Joshua Hanna and J. J. Roggen, of Pittsburg, and Sanford J. Smith, of St. Louis, trustees appointed by Henry O'Rielly in July last. That his business has been the superintendence of the line of telegraph known as the Peo-

ple's telegraph, but that he has not been employed personally to operate the Columbian Telegraph. He further states, that he did move a portion of the furniture of the Louisville office, but not the instrument or the table on which it is placed, across to Jeffersonville; but that he did not, from his imperfect knowledge of the nature and extent of the order of injunction, suppose that the part he took, or any thing he did in the matter, could be, or was, a violation of said order of injunction. He assisted in the erection of the wire from Main street, Louisville, to Jeffersonville, but that in so doing he intended no violation of the order of injunction. He has been in the office in Louisville and Jeffersonville—in Louisville before, and in Jeffersonville since, the removal—for the purpose of making up his accounts and reports, as in doing so he required the assistance of the clerk engaged in said office. These accounts consist of the receipts and expenditures of the line principally, embracing, also, a portion of the expenditures for construction. That he acted in the matter of erecting the *wire* before mentioned wire under the orders of Joshua Hanna, one of the trustees before named; and, as before stated, he had not a sufficient knowledge of the nature and extent of the order of injunction to perceive that he was in the slightest degree violating the same, never having read the order until this morning, in the clerk's office of this court. He further states, that he has not, in any thing that he has done, intended or desired to violate the order of this or any other court; and that whatever construction may be given to said order, he is ready and willing to obey the same in every particular; he does not wish to disobey in any particular any order which the court may make in the case. And now, having answered, he prays to be discharged.

October term, 1848.

Sworn to in open court, by S. K. Zook, this 9th November, 1848.
Att: JNO. H. HANNA, *C. C. C., K. D.*
By D. MURPHEY, *Dep. Clerk.*

Petition of Woolfolk and Zook.

(Petition of R. H. Woolfolk and S. K. Zook, to wit:)

To the honorable judges of the United States circuit court, 8th circuit, and Kentucky district.

Your petitioners, S. K. Zook and Richard Woolfolk, would respectfully state to your honor that they are young men without means, dependent upon their daily labor for their support, and should the fine adjudged by this honorable court against them this morning be enforced against them, they will be compelled to go to and remain in jail, unless the same shall be paid for them by their friends. They would further state to your honor that they have no disposition whatever to violate the order of this court, and that they are determined to abide by and obey the same in future, in every particular. They have already

given the bond required by your honor to that effect, and that bond will be most faithfully kept by each of them. Your petitioners would further state, that neither of them have any interest whatever in this line of telegraph; that they have only acted as the agents of others for compensation, and in that action without any intention or wish to violate or evade the injunction; and although it now seems that such their acts were in violation of the injunction, yet it was never intended to be violated by either of them. In view, therefore, of their situation in a pecuniary point of view, and the security which the complainants have in the bonds which they have given, they would respectfully petition your honor to remit the said fine.

RICH. H. WOOLFOLK,
S. K. ZOOK.

We, as the counsel of complainants, do not understand our clients as desiring more than protection in the rights which have been adjudged to belong to them, and therefore have no objection to the court remitting the fine referred to by these petitioners.

B. MONROE,
A. K. WOOLLEY.

Bond of R. H. Woolfolk.

(The bond of Richard H. Woolfolk, as follows:)

Know all men by these presents that we, Richard H. Woolfolk, and Theodore S. Bell, and W. N. Haldeman, are held and firmly bound unto Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, in the sum of five thousand dollars, to be paid to the said Samuel F. B. Morse, Alfred Vail, and Francis O. J. Smith, their certain attorney, their heirs, executors, administrators, or assigns; to which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, firmly by these presents. Sealed with our seals, and dated this 10th day of November, 1848.

The condition of this obligation is such, that whereas, in the circuit court of the United States for the Kentucky district, at the present October term, in the case of Samuel F. B. Morse, &c., vs. Henry O'Rielly, &c., on the return of an attachment issued on behalf of the complainants against Richard H. Woolfolk, Albert Jones, Henry S. Johnson, and S. K. Zook. On the hearing thereof—

It was found that Richard H. Woolfolk had been before the writ of injunction was issued, and has been ever since, in the employment of the defendants, in their office at Louisville, as their receiving clerk, wherein he did, after the writ had been executed, receive communications to be transmitted by their telegraph, and which were so transmitted in violation of the injunction; and that, after the removal of a portion of the instruments to Jeffersonville, he continued in this office, and received communications, which were transferred by the carriers of the defendants to Jeffersonville, and thence transmitted on the telegraph so